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Royal Commission on Matters of Health
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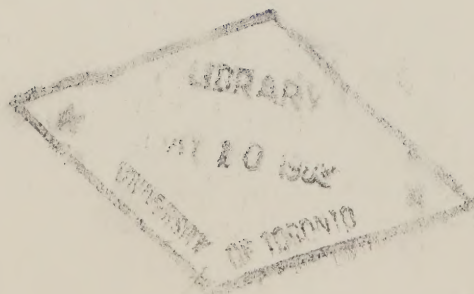
**POLICY OPTIONS IN THE REGULATION
OF ASBESTOS - RELATED HEALTH HAZARDS**

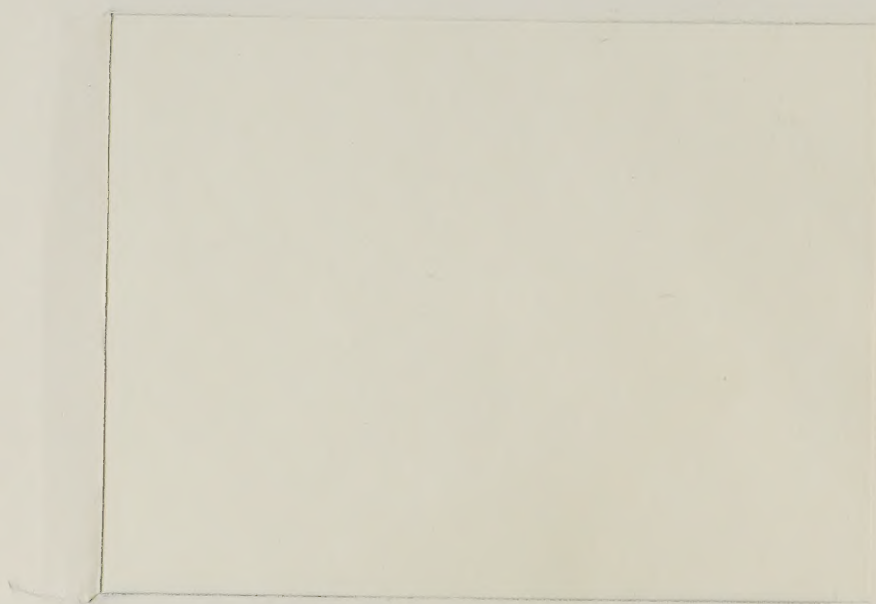
A Study Prepared By:

Carolyn J. Tuohy

Michael J. Trebilcock

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for

The Royal Commission on Matters of Health and Safety

Arising from the Use of Asbestos in Ontario

* * * * *

This study was commissioned by the Royal Commission on Asbestos, but the views expressed herein are those of the authors and do not necessarily reflect the views of the members of the Commission or its staff.

January 1982

POLICY OPTIONS IN THE REGULATION
OF ASBESTOS-RELATED HEALTH HAZARDS

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Table of Contents

	Page
Chapter 1 <u>Introduction</u>	1.1
<u>PART ONE: THE EVALUATIVE FRAMEWORKS</u>	
Chapter 2 <u>The Scientific Framework</u>	2.1
I. The Cancer Debate	2.2
II. The Asbestos Case	2.9
III. Policy Criteria	2.13
Chapter 3 <u>The Economic Framework</u>	3.1
I. The Economic Approach to Defining a Safety-Risk Optimum	3.1
II. Market Failure	3.5
III. Correcting for Market Failure	3.13
Chapter 4 <u>The Political Framework</u>	4.1
I. Modes of Political Decision-Making	4.1
A. Analytic Politics	4.2
B. Cybernetic Politics	4.8
II. The Pattern of Demand for Policies Regarding Health Hazards	4.11
A. The Politics of Prevention	4.11
B. Organized Interests in the Health Arena	4.14
1. Industrial Interests	4.15
2. Environmental Interests	4.16
3. Labour Interests	4.18
C. Public Opinion	4.20
D. The Issue Attention Cycle	4.22
E. The Workplace, The General Environment, and Public Buildings	4.23
III. The Supply of Policies: Ideology, Institutional Capacity, and Institutional Fragmentation	4.26
IV. Conclusion	4.30
Chapter 5 <u>Ethical Perspectives on Health Hazards</u>	5.1
I. Right to Life	5.1
II. Procedural Justice	5.5
III. Distributive Justice	5.11
A. Aristotle	5.12
B. Utilitarianism	5.14
C. Kant	5.16
IV. Conclusion	5.21

PART TWO: THE POLICY INSTRUMENTS

Chapter 6	<u>Improving Bargaining Processes</u>	6.1
I.	Introduction: Explicit and Implicit Bargaining Processes	6.1
II.	Explicit Bargaining Processes	6.4
III.	Implicit Bargaining Processes	6.15
	A. The Economic Framework	6.20
	B. The Ethical Framework	6.21
	C. The Scientific Framework	6.22
	D. The Political Framework	6.23
Chapter 7	<u>Civil and Criminal Liability</u>	7.1
	<u>Civil Liability</u>	7.1
I.	Introduction	7.1
II.	The Economic Framework	7.2
	A. Negligence	7.2
	1. Allocative Efficiency	7.2
	(a) Assessment of Benefits of Avoidance	7.4
	(i) Valuation of Loss	7.4
	(ii) Proving Causation	7.5
	(iii) Proving Aggregate Benefits	7.9
	(iv) Costs of Litigation	7.10
	(v) Availability of Insurance	7.10
	(vi) Judgement-Proof or Out-of-Jurisdiction Defendant	7.11
	(vii) Limitation Periods	7.13
	(viii) Effect of the Level of Safety	7.14
	(b) Assessment of the Costs of Avoidance	7.15
	2. Dynamic Efficiency	7.19
	3. Administrative Efficiency	7.20
	B. Private Enforcement of Public Standards	7.22
	1. Allocative Efficiency	7.23
	2. Dynamic Efficiency	7.25
	3. Administrative Efficiency	7.25
	C. Strict Liability	7.28
	1. Allocative Efficiency	7.28
	2. Dynamic Efficiency	7.30
	3. Administrative Efficiency	7.31
	D. Class Action Suits	7.32
	E. Conclusion	7.34
III.	The Scientific Framework	7.36
IV.	The Ethical and Political Framework	7.41
	<u>Criminal Liability</u>	7.45
I.	Introduction	7.45
II.	Potential Areas of Criminal Liability	7.46
	A. Common Nuisance: Criminal Code, Section 176	7.46
	B. Duties of Master to Servant: Criminal Code, Section 201	7.47
	C. Criminal Negligence: Criminal Code, Sections 202, 203, 204	7.48
	D. Manslaughter: Criminal Code, Section 217	7.49
III.	Problems Common to All Potential Prosecutions	7.49

Chapter 8	<u>Taxes and Subsidies</u>	8.1
I.	Introduction	8.1
II.	Economic Framework	8.1
	A. Taxes	8.1
	1. Allocative Efficiency	8.4
	2. Dynamic Efficiency	8.12
	3. Administrative Efficiency	8.13
	B. Subsidies	8.15
	1. Allocative Efficiency	8.16
	2. Dynamic Efficiency	8.17
	3. Administrative Efficiency	8.17
III.	The Political Framework	8.18
IV.	The Ethical Framework	8.21
V.	The Scientific Framework	8.22
Chapter 9	<u>Standard-Setting</u>	9.1
I.	The Popularity of the Approach	9.1
II.	Decision Rules	9.3
	A. Zero-Risk: The 'Delaney' Principle	9.5
	B. Technological Feasibility	9.8
	C. Weighing Costs and Benefits	9.9
	1. The Criterion of Choice	9.13
	2. The Identification of Costs and Benefits	9.17
	3. Data Assembly and Analysis	9.24
	D. Decision Rules: A Critique	9.27
III.	The Institutional Framework	9.40
	A. Bargaining	9.43
	B. Managerial Discretion	9.48
	C. Adjudication	9.50
	D. Consultation	9.60
	E. Incentives in the Consultation Process	9.73
IV.	Conclusion	9.78
Chapter 10	<u>Conclusion</u>	10.1
I.	Four Frameworks of Evaluation	10.1
	A. Scientific Framework	10.2
	B. The Economic Framework	10.2
	C. The Political Framework	10.3
	D. The Ethical Framework	10.5
II.	The Instruments	10.5
	A. Improving Bargaining Processes	10.5
	B. Civil and Criminal Liability	10.6
	C. Taxes and Subsidies	10.7
	D. Public Standard-Setting	10.7
III.	The Optimal Mix of Instruments	10.10

CHAPTER 1 INTRODUCTION

As Aaron Wildavsky has pithily put it, "policy analysis is an activity creating problems which can be solved."¹ There is more to this nugget of wisdom than the conventional recognition that the first step in problem solving is a clear identification and definition of "what is wrong." Wildavsky's observation pushes us to the further recognition that the way in which a problem is defined implies or entails its solution: the range of "therapies" is delimited once the "diagnosis" is made. And from this insight it is a short but necessary step to the recognition that various disciplines and institutions define problems in terms of their own capacities to respond; they translate policy issues into problems for which they have (or potentially have) solutions. A broad canvassing of potential responses to the issues before the present Commission, which is the purpose of this paper, may thus involve looking at problems and solutions from different disciplinary or institutional perspectives.

The problems presented by the health and safety effects of asbestos can be defined from at least four different perspectives: those of science, economics, politics, and ethics. Each of these perspectives raises distinctive questions; and in each case the answers are confounded by complexities and uncertainties surrounding the relevant factors. Decisions about the assessment, allocation, and distribution of risk to life are among the most difficult and highly charged in the public policy arena; and there is scope for extensive and intensive disagreement among these perspectives.

In practice, policy rationales are rarely purely scientific, economic, political, or ethical in inspiration. It is the influences and tensions among these approaches which forms the matrix of policy. The area of health hazards, for example, is marked by a politicization of scientific disputes, by an ongoing tension between political and economic decision-making, and by abortive attempts to find scientific, political, or economic solutions to essentially ethical problems.² Nonetheless, these frameworks are not identical -- indeed the policy responses which they prescribe are often mutually inconsistent -- and there is much to be learned in tracing out their distinctive contributions while recognizing their inevitable interrelationships.

In Part One of this paper, we shall suggest how the public policy "problem" posed by the hazardous properties of asbestos can be defined from each of the perspectives we have identified: science, economics, politics, and ethics. From each of these perspectives, we shall consider whether there appears to be a problem requiring a public policy response -- and if so what criteria any proposed solution should satisfy. Not surprisingly, the various scientific, economic, political, and ethical criteria exist in some tension; no one solution is likely to be optimal from all perspectives.

In Part Two, we shall proceed to describe and to evaluate a range of policy instruments against these various criteria. After considering the capacity of improved private bargaining processes, criminal and civil liability systems, and taxation and subsidy instruments to respond to the various dimensions of the asbestos problem, we shall focus our discussion upon public standard-setting as the option which potentially satisfies the broadest set of criteria. In particular, we shall trace out the elements of a standard-setting process which is most likely to address scientific, economic, political, and ethical concerns.

As noted, however, a degree of tension among these concerns is inescapable, and even a carefully designed standard-setting process appears at best, and on balance, to be the least imperfect of the instruments available. Our final chapter is addressed to a consideration of the supplementary policies which might mitigate the residual imperfections of a standard-setting approach -- in other words, to a discussion of the optimal mix of policy responses to asbestos-related health hazards.

Notes to Chapter 1

1. Aaron Wildavsky, Speaking Truth to Power: the Art and Craft of Policy Analysis (Boston: Little, Brown, 1979), p. 17.
2. Furthermore, our delineation of separate frameworks is not to suggest, for example, that scientists, economists, or politicians ignore ethical problems -- individuals, whatever their disciplinary base, may bring a number of these frameworks to bear in thinking about the problems of health hazards.

PART ONE: THE EVALUATIVE FRAMEWORKS

CHAPTER 2 THE SCIENTIFIC FRAMEWORK

The scientific problem presented by the issue of asbestos as a health hazard is the need to assess the nature and extent of the health risk associated with the use of the mineral. From a scientific perspective, then, the public policy questions to be addressed are as follows: Is governmental intervention necessary in order that the magnitude of the health risk posed by asbestos can be determined? If so, what forms of intervention best facilitate that determination?

In the present context, the magnitude of the health risk from asbestos is a matter of considerable scientific complexity and uncertainty. The complex etiology of the forms of cancer and other diseases related to the use of asbestos are imperfectly understood, and the empirical investigations which might improve this understanding must contend with substantial data problems. It is not our intention to explore the full extent or the fine detail of the scientific issues and controversies in this area. But it is appropriate and indeed necessary that we consider their public policy implications.

These implications are two-fold. Disagreement among scientists means that decision-makers, in either market or non-market structures, are left without firm guidelines regarding the health effects of various levels and types of asbestos exposure. And, perhaps even more critically, these disagreements may undermine the very credibility of scientific evidence. This credibility is even further undermined to the extent that the choice of causal models and experimental and statistical techniques appears to be biased by economic or political interests.¹ Hence, decision-makers not only lack information, but they also mistrust the sources of information. In the highly charged political atmosphere surrounding the

asbestos issue (an atmosphere to be discussed in more detail in a later chapter), scientific evidence may be seen less as a basis for informed choice than as political ammunition among contending groups.

The politicization of scientific debate over the assessment of health hazards has led to the recurrent suggestion that the definition and solution of problems in this area is a matter more of policy than of science. There is undoubtedly some truth in this assertion -- it may well be, as we shall suggest later, that institutional changes in the policy process are necessary to facilitate the resolution of scientific controversy. But science nonetheless has a distinctive approach, and potentially a distinctive contribution. To a much greater extent than is the policy process generally (as we shall see in later chapters), scientific thinking is governed by an analytic paradigm, in which action proceeds from a broad canvassing of alternatives and an understanding of causal linkages. Although the range of variables and analytic techniques may be constrained by the belief systems of individual researchers and research centres, the prevailing norm of scientific inquiry is the improvement of the 'causal blueprint' of the environment.

I. The Cancer Debate

Let us first consider the scientific debate over the role of asbestos as a carcinogen. These discussions take place in the context of a larger debate over appropriate models of carcinogenesis. Although the understanding of the pathogenic processes involved varies with different types of cancer and with different carcinogens, the field is generally characterized by considerable controversy.

Certain themes and analogies are common to both the biological and the epidemiological contributions to this debate. Biological researchers seek to understand why an individual cell begins to behave in an aberrant,

'malignant' way unrelated to its normal role in the functional integrity of an organism. Some theories focus upon suspected weaknesses or abnormalities in the cell itself -- in its genetic programme or in its immunological defences. Others focus upon an agent or combination of agents (such as viruses) external to the cell itself, which alter the cell's genetic blueprint or its surface structure or otherwise disrupt its relationship with surrounding cells. Whatever the primary focus, most approaches acknowledge the likelihood that most cancers result from complex interactions among more or less susceptible cells and a variety of carcinogens. And there does appear to be widespread but not universal acceptance of the view that the malignant behaviour of a single cell is sufficient to produce, through a process of cell reproduction, a clinical cancer. In most cases, however, there is little firm biological understanding of the physical or chemical processes which induce this alteration in behaviour, or of the levels at which physical or chemical factors must be present in order to do so.

This debate has repercussions for the development of epidemiological models to explain the incidence of various cancers in human populations. Do environmental carcinogens require a susceptible host? To what extent is susceptibility congenital? To what extent do environmental factors interact with a sort of carcinogenic one-two punch, first to weaken and then to invade the host?

The lack of generally accepted causal models complicates, in the first instance, the identification of carcinogens. And even when a particular factor or set of factors has been identified as posing a cancer risk, competing causal models may imply different "dose-response" relationships: different assessments of the precise magnitude of the cancer risk at varying levels of occurrence of the carcinogen. In

particular, there may be different judgements as to the existence of safe "thresholds" below which no risk exists.

Without a firm theoretical base for the assessment of cancer risks, decision-makers must rely upon statistical evidence regarding the relationship between certain factors and cancer incidence. Such evidence may be gathered through bio-assays in which animals are exposed to varying levels of suspected carcinogens in carefully controlled laboratory experiments, and through epidemiological methods relating the incidence of cancer in human populations to the occurrence of suspected carcinogens. The battery of statistical and experimental methods in this area is fairly well-developed and agreed upon; but these methods must in practice be applied to data which are flawed in a variety of ways; and the choice among methods on the basis of their relative power in a given situation is rarely unambiguous. Hence scientific debate at this level tends to take the form of methodological critiques within a relatively well-established framework.

In the case of the bio-assay, for example, critiques tend to focus on problems of estimating cancer risks at low doses of a carcinogen by extrapolating from the observation of cancer incidences at high dose levels (although there is additional controversy over the validity of extrapolating from effects in animals to effects in humans). The use of high dosage levels in bio-assays stems from the practical necessity of keeping the sample of exposed animals to a manageable and affordable size. (A standard assay of 600 rats takes two to three years and costs almost \$300,000. In order to detect a statistically significant excess cancer risk of .01 percent -- a risk which would produce 300 cancers in an exposed population of three million -- 30,000 rodents would be required, and that would test only one dose level and one route of administration. If a more manageable sample is to be used, the dose

must be increased to increase the proportion of the sample which is likely to develop the disease.)⁴

Depending upon the degree to which causal models have been elaborated and verified, biological theories may be of some guidance making these extrapolations from high dose to low dose effects. (For example, the theory that the alteration of a single cell is sufficient to trigger the growth of a clinical cancer has been used to hypothesize low dose effects,⁵ although this model in itself says nothing about the dose necessary to achieve an alteration in a single cell.) But in general, researchers are thrown back upon methods of statistical inference in order to estimate the shape and slope of the function which best fits the observed data. A lognormal relationship, for example, lends support to the notion of a safe threshold, as would a linear relationship with a positive intercept. A linear relationship with an intercept through the origin, on the other hand, would imply that cancer risk begins to increase proportionately at the very lowest levels of the occurrence of the carcinogen.

Depending upon the type of cancer or the type of carcinogen involved, epidemiological data may also cluster in the large dose region, and may involve similar problems of extrapolation. (As we shall see, epidemiological data regarding asbestos exposure present just such problems.) Furthermore, epidemiological studies generally do not admit of the degree of control which can be exercised in bio-assays. Clinical trials involving human subjects assigned at random to different groups, each of which is then exposed to a different dose of a suspected carcinogen, (including one group receiving a zero dose) would clearly be unacceptable on ethical grounds. Epidemiologists must rely largely on ex post controls in which groups of subjects who have contracted cancer are

compared along a number of dimensions (through matching or through a variety of multi-variate analytical techniques) with groups of individuals who have not contracted the disease. Matching and controlling for bias in such retrospective studies is extremely difficult. Somewhat less susceptible to sample bias and errors in dose measurement, but much more expensive and lengthy, are cohort studies which track matched groups of individuals, one or more of which groups are exposed through their occupation, place of residence or lifestyle to a suspected carcinogen, and one of which is not so exposed. A further problem in epidemiological research is presented by the small absolute numbers of observations of a given cancer in populations exposed to a given carcinogen -- levels of observation at which most statistical techniques require that differences between exposed and unexposed populations be relatively large before they can confidently be said to be non-random occurrences. Critiques of epidemiological research hence tend to focus upon omitted control variables or upon small sample sizes.

Apart from the distribution of the data regarding dose and response, there are problems with their quality, particularly that of epidemiological data. Past exposure levels have rarely been monitored and recorded with regularity, or to present-day standards of precision. The diagnoses may be missed, particularly when the disease is rare or the symptoms non-specific. Furthermore, there are disincentives for industrial sources to maintain records of illnesses related to hazards in the
 6
 workplace. Even where diagnoses are properly made and recorded, health records rarely include the range of variables relevant to epidemiological research. Finally, there are problems of tracking individuals who have left the site of exposure -- an essential step in order to distinguish between the effects of cumulative dose and the effects of time since first exposure, as well as to ensure that the full incidence of disease is captured.

From a public policy perspective, the significance of this scientific debate over causal models, experimental methods, and data is not only the uncertainty which it creates but also its tendency to erupt into the political forum. The lack of resolution in the scientific arena provides a range of models and methods from which a selection can be made in the service of a political position. And equally, of course, any selection can also be criticized from an opposing political viewpoint. Hence models which attribute carcinogenic potential to congenital factors or to "lifestyle" factors such as cigarette smoking and diet are perceived among environmental and occupational health activists as part of a strategy by industrial interests to "blame the victim."⁷ Conversely, models which indict a wide variety of environmental agents as carcinogens, either alone or in combination, are derided by industrial interests as the result of "cancerphobia."⁸

Experimental methods, as well as causal models, are also subject to this sort of "politico-scientific" debate. The results of bio-assays have been challenged because they test for effects in non-human biological systems and because they involve high dosages. Hence the bio-assay evidence implicating cyclamates as carcinogens has been derided by an American official because "an adult would have had to drink 138 to 552 12-ounce bottles of soft drinks a day to get an amount comparable to that causing cancer in mice and rats."⁹ Conversely, the theoretical and experimental difficulties of assessing low dose response have been interpreted to mean that no safe threshold can be proved to exist, and that the suspected carcinogen ought to be banned.¹⁰ In the absence of firm experimental evidence, such arguments are often bolstered by anecdotal evidence of low dose responses. Such evidence is scientifically of extremely limited value; it rarely involves an actual measurement of dose, or a consideration of possibly confounding variables. Nonetheless such evidence is striking, immediate, and, when science defaults, often persuasive.

One of the most substantial and extensive examples of this type of controversy surrounded the publication of proposed "generic" regulatory standards for carcinogenic chemicals by the U.S. federal government's Occupational Safety and Health Administration. OSHA's proposals were backed by extensive documentation prepared by the National Institute of Occupational Health and Safety. In January, 1978, the American Industrial Health Council (a task force set up by the Manufacturing Chemists' Association and representing 120 companies and 60 trade associations) published a document drawing upon biological models and epidemiological evidence regarding the carcinogenic effects of industrial chemicals, to criticize the scientific basis (and the economic implications) of the OSHA proposals. In September of that year, the U.S. Department of Health, Education and Welfare published an extensive rebuttal prepared by its own selection of experts in chemical carcinogenesis, epidemiology, and bio-statistics, drawn from the National Cancer Institute, the National Institute of Environmental Health and Safety, and the National Institute for Occupational Safety and Health. The AIHC replied with a second document in October 1978.¹¹

The HEW and AIHC documents diverged on every major point. Regarding models of carcinogenesis, the AIHC emphasized the role of lifestyle factors, while HEW emphasized the interactive effects of a variety of factors including industrial carcinogens. As for trends in cancer incidence, the AIHC documents estimated one to five percent of all cancers to be attributable to occupational carcinogens, while the HEW estimate was in excess of 20 percent and increasing--asbestos-related cancers alone were projected as accounting for 13 percent to 18 percent of all cancers in the coming three decades.¹² (Interestingly, the AIHC diverged on this

point from a report prepared by two of its own consultants, which concluded that "the proportion of total cancer attributable to occupational exposures of 20 percent is a reasonable one, perhaps in the lower mid-range of likelihood. We think the full range ... may be from 10 per cent to 33 percent or perhaps higher if we had fuller information on some other potentially carcinogenic substances."¹³ Not surprisingly, this consultant's report has been widely cited by occupational environmental health advocates.¹⁴)

Finally, the AIHC and HEW documents challenge each other on epidemiological grounds. HEW maintained that available epidemiological data underestimate the true risk because they were gathered during tracking periods too short to take account of the long time lag in the effect of occupational carcinogens, while AIHC maintained that available data in fact overestimate present levels of risk because they involve exposures to higher doses than currently prevail.

II. The Asbestos Case

To this point, we have been considering the types of scientific controversy and the politicization of scientific debate which complicate decision-making regarding cancer hazards in general. When we turn our attention to the issue of asbestos in particular, these controversies are especially evident.

That asbestos causes cancer and asbestosis is no longer in dispute, but scientific uncertainty still surrounds the questions of dose-response relationships, of the relative potency of different types of asbestos fibres, and of the role of intervening variables such as cigarette smoking and genetic susceptibility.

The scientific difficulties in these areas arise from an imperfect understanding of the biopathology of asbestos-related disease and from severe data and measurement limitations. Available data regarding both dose and response are in many cases only poor estimates of the true values. As two epidemiologists have noted, "ideally, to measure dose one requires to know the amount of fibre that reaches the target organ and the period of time during which it exerts a deleterious effect. In man, however, the only information consists of measurements in the workplace of the concentration of dust available to be inhaled."¹⁵ But even where measurements of dust concentration over time are available (and in many cases they are not), they are problematic. Asbestos-related diseases develop only long after initial exposure. Full-scale epidemiological studies of the consequences of asbestos exposure began in the 1950's and continue to the present, and therefore the weight of accumulated epidemiological evidence involves workers who were initially exposed to asbestos 20 to 50 years ago, when levels of asbestos dust in occupational settings were much higher than at present. It has been estimated, for example, that exposures for workers in various jobs at one Ontario asbestos-cement factory were respectively 200, 32, and 26 times higher in the period 1948-54 than in the late 1970's.¹⁶

Furthermore, changes in measurement technology--from static to personal sampling, and from the whole field to the eye-piece graticule method of measurement--complicate the comparison of exposure levels as measured at different points in time. Units of measurement also differ historically and across jurisdictions. Historical data on Quebec chrysotile miners and millers, measuring exposure levels as millions of particles/cubic foot, have been interpreted to show an excess cancer risk of one percent resulting from exposure to any concentration within a range of 1 fibre/cm³

to 5 fibres/cm³, depending on the factor used to convert particles/foot³ to fibres/cm³.¹⁷ Finally, measurements of concentration have not so far specifically incorporated fibres shorter than 5 microns in length, which have been measurable only as electron microscope technology has become available. The proportionate relationship, if any, between short and long fibres -- and indeed, the question of whether short fibres have the same pathogenic effect as long fibres -- have not yet been determined.

Data problems exist not only regarding dose but regarding response. Diagnostic problems complicate the identification of mesothelioma and asbestosis. And the reporting and tracking problems discussed above complicate epidemiological research on asbestos as on other health hazards.

One of the issues peculiar to asbestos is the possibility that different fibre types have different pathological effects. The determination of these differential effects, if any, is also fraught with theoretical and methodological difficulties. Physical models of carcinogenesis could imply differential effects, since the physical properties of fibre types differ -- but these models, as noted, have not been verified. And epidemiological research is complicated by the fact that the mining and milling of different fibre types is carried out in different geographical areas of the world, with different populations of workers -- a fact which introduces a number of possible confounding variables into the comparison of the effects of fibre type. Furthermore, different fibre types are usually submitted to different industrial processes. Where different types are involved in the same process, it is typically in the form of mixtures, and the proportion of different fibre types in dust concentrations in such situations has rarely been recorded over time.

The uncertainties introduced by these data and measurement difficulties are compounded by the politicization of the scientific debate regarding the health effects of asbestos. Each of the outstanding questions

has political overtones. If a "safe threshold" cannot be held to exist, the debate shifts to the politically, economically, and ethically charged question of implicit or explicit risk/benefit judgements. The discussion of cigarette smoking or genetic factors raises allegations of "victim blaming." And the investigation of the differential effects of fibre type has been perceived by some occupational health and safety advocates as an attempt by North American industrial interests to "absolve" chrysotile (or at least to tolerate greater exposures to this fibre type than to others), since chrysotile is the only type mined in North America and comprises about 95 percent of the asbestos used on this continent.¹⁸

Asbestos-related industries have funded research through industry-sponsored "institutes," "councils," and "centres." The Quebec Asbestos Mining Association, for example, has established an Institute for Occupational and Environmental Health. The Asbestos Information Centre in the United Kingdom, and the Asbestos Information Association of North America, both industry-sponsored, have commissioned studies and conferences.

Labour has been slower to establish such forums, although some international unions have established health and safety departments and contractual relationships with individual researchers such as Irving Selikoff of Mount Sinai Hospital in New York, and Thomas Mancuso of the University of Pittsburgh. The AFL-CIO has recently established a Workers' Institute for Safety and Health in the United States; and the Canadian Labour Congress recently sponsored a conference on occupational carcinogens.

Perhaps in default of a stronger labour effort in these areas, the major scientific opposition to industry-sponsored research has been mobilized under the aegis of governmental agencies, particularly in the United States -- such as the National Institute for Occupational Safety and Health, and the Occupational Safety and Health Administration.

Furthermore, some relevant professional societies have tended to take positions fairly consistently either in support of or in opposition to industrial interests. The Society of Toxicology and the American Conference of Governmental Industrial Hygienists, for example, are considered, at least by environmental and occupational health advocates, to be "industry oriented," whereas the Society for Occupational and Environmental Health is closely identified with prominent occupational and environmental health advocates. Various interests in the asbestos arena in Canada have drawn heavily upon these contending U.S. sources of "scientific" advice, and the debate has been equally politicized in this country.

III. Policy Criteria

It is clear that decision-making regarding asbestos exposure is severely hampered by the lack of credible and consistent scientific evidence regarding the health risk which it poses. One scientific yardstick for the assessment of public policies regarding asbestos exposure, then, should be the extent to which they provide for the ongoing generation of data regarding the effects of asbestos exposure -- for the refinement of measurement and diagnostic techniques, and for the maintenance of records of the health histories of exposed individuals. It is particularly important that data be built up regarding the long-term observed effects of current relatively low doses. Of equal and perhaps prior importance from a scientific perspective, however, is the development of a degree of scientific consensus regarding the generation and interpretation of data, sufficient to allow for the progressive development of scientific knowledge.

Each of the policy instruments to be discussed in later chapters can be, and will be, assessed against these criteria -- their capacity

to generate data and to achieve sufficient scientific consensus to allow for the cumulative development and testing of hypotheses. It is evident however that, in the present state of the scientific field, the contribution of science itself to the resolution of issues in the health hazard arena is relatively limited. In fact, most of the issues reviewed in this chapter could be characterized, in Alvin Weinberg's terminology, as "trans-scientific." In developing this concept, Weinberg has identified trans-scientific issues as those which "can be asked of science and yet which cannot be answered by science.... Though they are, epistemologically speaking, questions of fact and can be stated in the language of science, they are unanswerable by science, they transcend science."¹⁹

Trans-scientific questions, then, have the following characteristics. They can be framed in terms of systematic models or "causal blueprints" of physical reality. The empirical testing and validation of these models by scientific methods, however, is constrained in any of a number of ways. One of the most obvious is the ethical objection to testing on human subjects (a consideration which clearly constrains scientific investigation of carcinogens). Another is the insufficiency of available data, when the generation of sufficient data is impossible within given resource, time, or technology constraints. It may be necessary to test millions of laboratory animals, to monitor human populations over decades or even generations, or to develop more refined techniques of measurement. These constraints are partly technological and logistical and partly imposed by the policy process itself. Policy-makers for a variety of political, economic, and ethical reasons to be noted below, are unlikely to be willing either to deter decisions about health hazards for decades or generations or to commit the enormous resources entailed in "mega-mouse" or "mega-monkey" experiments.

The range of trans-scientific issues is hence potentially very wide. Any constraint on empirical testing reduces the certainty with which a scientific model can be validated, although these constraints are more severe in some cases than in others. Within this range there is a wide grey area in which scientific judgement shades into a broad "policy" judgement.

Despite the difficulty of teasing out their separate influences upon a given decision, there are important distinctions to be made between these two forms of judgement about the likelihood of a model's validity. Scientific judgement turns upon such factors as experience with the relative power of experimental techniques, analogy with more firmly established models, or even an intuitive "feel" for the data. Policy judgement is essentially results-oriented; it is based on an assessment of the likely impact, on a range of values, of the consequence of acting as if a given model were verified. A policy judgement to accept a model of dose-response relationships exhibiting a "safe threshold," to take one of the simplest examples, is likely to support a decision to tolerate higher exposure levels than would a policy judgement to accept a model exhibiting no safe threshold. And a policy judgement to accept neither model, pending more evidence, supports the status quo.

Such policy judgements may be shaped in part by attitudes to risk. They may be influenced by the credibility of various sources of scientific opinion. But policy judgements are likely to be most heavily determined by the evaluation of their likely "results" against a range of political, economic, and ethical criteria. How will various political constituencies respond to an increase or a reduction in exposure levels? Is a change in exposure levels likely to increase or retard the growth or efficiency of a particular industrial

sectors or of the macro-economy? Who bears the costs and who receives the benefits of changes in exposure levels, whatever the magnitude of those costs and benefits?

These policy criteria themselves are not unambiguous, however. The policy arena in which decisions about the control of health hazards are to be made is itself characterized by political, economic, and ethical complexities and uncertainties -- the complexities arising from a network of interdependent interests and values and the uncertainties pertaining largely to unknown and perhaps unformed individual and collective preferences.

There is a perverse circularity in all this. Given the present state of scientific complexity and uncertainty about health hazards (and indeed any state of the field in the foreseeable future) it is necessary for those making decisions about exposure to those hazards to make policy judgements about the likely validity of scientific evidence and inference. These policy judgements are complicated by political, economic, and ethical complexities and uncertainties. But these political, economic, and ethical complications, as the following chapters will indicate, are themselves exacerbated by the lack of an established body of fact accessible to lay understanding.

Notes to Chapter 2

1. The tendency for such biases to occur in the scientific assessment of health risks has been noted by Zeckhauser: "Individuals who assign significant magnitudes to the types of losses that are potentially incurred tend to express beliefs about physical processes that support the argument that the expected number of such losses will be great, and vice versa. ... Ideally scientific judgement would be independent of valuations of outcomes." R. Zeckhauser, "Procedures for Valuing Lives," Public Policy 23:4 (Fall 1975): 421n.
2. William Lowrance, Of Acceptable Risk: Science and the Determination of Safety (Los Altos: Kaufman, 1976), pp. 100-101; Alvin Weinger, "Science and Trans-science," Minerva 10 (1972): 209-222; Ontario Federation of Labour, Written submission to the Royal Commission on Asbestos, #35, January 1981.
3. The phrase is from Herbert Simon, "The Architecture of Complexity," in Herbert Simon, The Sciences of the Artificial (Cambridge: MIT Press, 1968).
4. This illustration is borrowed from David Ozonoff, "Public Relations Cancer," Society (March/April 1981): 13-14.
5. Ibid., p. 14; see also Lloyd Tataryn, Dying for a Living (Toronto: Deneau and Greenberg, 1979), p. 177.
6. See Morley Gunderson and Katherine Swinton, Collective Bargaining and Asbestos Dangers at the Workplace, Study No. 1 prepared for the Royal Commission on Asbestos (Toronto: The Commission, December 1981).
7. Robert Crawford, "Cancer and Corporations," Society (March/April 1981): 23; Samuel Epstein, The Politics of Cancer (New York: Anchor, 1979), pp. 425ff; Tataryn, op. cit. note 5, at p. 186.
8. Elizabeth Whelan, "Chemicals and Cancerphobia," Society (March/April 1981): 5-8. Similarly, a recent address to the Canadian Nuclear Association attributed negative publicity regarding the development of nuclear power to a phobic response. "Fear of N-power much like phobia, MD tells meeting," Globe and Mail, Toronto, 10 June 1981.
9. Letter from the Acting Commissioner of the Food and Drug Administration to the U.S. House of Representatives Committee on Appropriations, 17 May 1973, quoted in Lowrance, op. cit. note 2, at p. 69.
10. See, for example, the views expressed by John F. Finklea, then Director of the National Institute of Occupational Safety and Health in the U.S. in 1976:

Because it is not possible to specify a safety exposure level for a carcinogen, only a ban on the use of asbestos can ensure complete protection against this mineral's carcinogenic effects. Therefore emphasis should be placed on prohibiting the occupational use of asbestos in other than completely closed operations and on substituting other products wherever possible.

Memorandum from J.F. Finklea to Assistant Secretary for Health, "Evaluation of Data on Health Effects of Asbestos Exposure and Revised Recommended numerical Environmental Limits," 15 December 1976, quoted in Epstein, op. cit. note 7, at p. 87. See also Ontario Federation of Labour, op. cit. note 2.

11. These documents are reviewed, albeit from the perspective of an occupational health and safety activist, in Epstein, op. cit. note 7, at pp. 373-378.
12. It should be noted that these estimates have subsequently come under considerable epidemiological criticism. See, for example, Julian Peto, Brian E. Henderson, and Malcolm C. Pike, "Trends in Mesothelioma in the U.S. and the Forecast Epidemic Due to Asbestos Exposure During World War II," in Banbury Report 9: Quantification of Occupational Cancer (New York: Cold Springs Harbor Laboratory, 1981); J. Corbett McDonald and Alison D. McDonald, "Mesothelioma as an Index of Asbestos Impact," in Banbury Report 9, op. cit.; J. Higginson, et al. "Proportion of cancers due to occupation," Preventive Medicine 9:2 (1980): 180-188; M.D. Hogan and D.G. Hoel "Estimated Cancer Risk Associated with Occupational Asbestos Exposure," Risk Analysis 1:1 (1981): 67-76.
13. Study by R.S. Stallones and T. Downs for the American Industrial Health Council, quoted in Castleman, "Preventing Catastrophe," Society (March/April 1981): 12.
14. Ibid.; Epstein, op. cit., note 7, at p. 431.
15. E.D. Acheson and M.J. Gardner, "Asbestos: Scientific Basis for Environmental Control of Fibers," in Biological Effects of Mineral Fibres, Vol. 2, ed. J.C. Wagner, IARC Scientific Publications, no. 30 (Lyon: International Agency for Research on Cancer, 1980), p. 737. There is limited recent evidence that some valid information on past asbestos exposure may be obtainable from microscopic examination of lung washings. Di Menza, et al., "Assessment of Past Asbestos Exposure in Patients: Occupational Questionnaires vs. Monitoring in Broncho-Alveolar Lavage," in Wagner, ibid., p. 609.
16. Murray M. Finkelstein, "Asbestosis among Long-Term Employees of an Ontario Asbestos-Cement Factory," mimeographed (Toronto: Ontario Ministry of Labour), p. 10.
17. Acheson and Gardner, op. cit. note 15, at pp. 750-751.
18. Tataryn, op. cit. note 5, at p. 51.
19. Weinberg, op. cit., p. 209. See also Harvey Brooks, "Science and trans-science," Minerva 10 (1972): 484-486; Lowrance, op. cit. note 2, at p. 113.

CHAPTER 3 THE ECONOMIC FRAMEWORK

I. The Economic Approach to Defining a Safety-Risk Optimum

It is intuitively easy to accept that a health hazard that carries an absolute certainty of death or injury on the part of everyone who is exposed to it cannot be socially optimal. Economists, however, often argue that an absolutely zero risk of injury or death from a workplace or product environment is also generally not a socially optimal goal. Thus, the socially optimal risk factor associated with a workplace or product environment is somewhere between zero and one (but not at either limit).

Hence, the question becomes: What is the right amount of occupational health and safety, or conversely what is the right level of risk of health hazard to which people should be subjected?

Conventional economic analysis would attempt to supply an answer to this by resort to a welfare maximization framework.

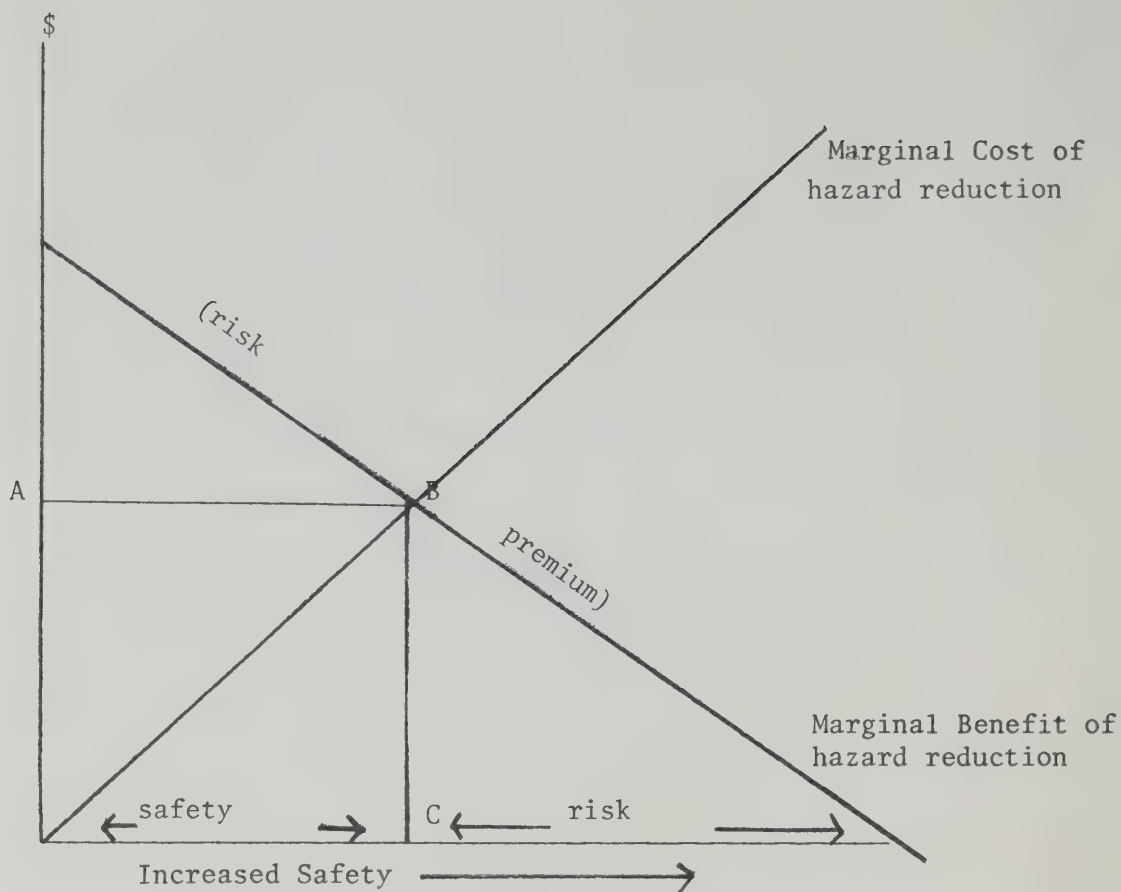
This framework initially postulates an idealized world where all markets function perfectly. That is to say:

- (i) There are many buyers and sellers in a market, such that the activities of any one economic actor have only a negligible effect on the total market.
- (ii) There is freedom of entry into and exit from the market.
- (iii) The commodity sold in the market is homogeneous; that is, essentially the same product is sold by each of the sellers in the market.
- (iv) All economic actors in the market have complete information about the nature and value of the commodities traded (i.e., there are no information costs).

- (v) There are no costs involved in negotiating or concluding exchanges (i.e., there are no transaction costs).
- (vi) All the costs of producing a commodity are borne by the producer and all the benefits of a commodity accrue to the consumer (i.e., there are no externalities).

In the case of idealized labour markets that meet these conditions one would expect bargaining outcomes to yield a mix of occupational safety and risk such that the social costs of health hazards and the social costs of investments in risk reduction are minimized. The economic logic that drives a market to this outcome works as follows: suppose that I am perfectly informed about the health risks confronting me in the event that I take up employment with a firm in a given industry and that other occupational choices are freely open to me. I thus know the distribution of risks of various eventualities and the consequences to me if any of these materialize. I will demand a risk premium that accurately reflects the expected cost to me of assuming these risks. Thus, if there is a 10% chance over the course of a year of my suffering an injury, the disutility to me of which I value at the equivalent of \$1,000, I will demand a risk premium over the year of \$100 (assuming risk neutrality). This risk premium fully reflects the expected social costs of the health hazards associated with my employment

in this industry. My prospective employer faces a calculus whereby he must either pay me (and my fellow employees) the \$100 risk premium or invest resources in reducing the health risks to which the premium relates or pay me a wage factor sufficient to induce me to take self-protective measures (e.g., wear a mask or ear muffs) and bear the cost (e.g., discomfort) associated therewith. If, for the sake of argument, he can halve the risk of injury (from 10% to 5%; expected cost 5% of \$1000 = \$50) by an investment of \$20 in safety precautions, he can save himself \$30 (a risk premium of \$50 + \$20 investment in safety precautions = \$70, compared to a risk premium of \$100 that must be paid in the absence of any investment in safety precautions). Alternatively, he may also be able to halve the risk of injury by paying me \$10 to induce me to wear protective equipment, in which case he can save himself \$40 (a risk premium of \$50 + \$10 to induce self-protective measures by me). The employer will keep investing in safety precautions (either directly himself or by inducing employees to take lower-cost self-protective measures) until further marginal investments in safety precautions yield exactly equivalent marginal reductions in risk premiums demanded. Thus the last dollar invested in safety precautions (a social cost) will yield exactly one dollar's worth of risk reduction to employees (a social benefit). This is depicted in the diagram following:



The diagram depicts marginal costs to an employer of hazard reduction rising as it becomes more costly to reduce more remote health risks further, while marginal benefits to an employee from reduction of more remote health risks decline, which decline is reflected in declining risk premiums demanded for assuming these more remote risks. Any point left of C on the horizontal axis leaves the employee demanding a premium for risk in excess of the cost of reducing that risk by investments (by the employer) in further safety precautions. Any point beyond C involves investments by the employer in safety precautions (reflected in a decrease on real wages) in excess of the valuation of the benefits of those precautions by the employee. Thus the private (and social) safety/risk optimum occurs at point C (and point C only).

This balance between safety and risk is optimal in the sense that no further negotiations between the parties are able to produce more mutually advantageous bargains. At this point, no one can be made better off without someone being made worse off. This is the economic concept of Pareto-optimality. It is important to note that each side to the negotiations is required to take account of the costs of their relationship to the other: the employer is required to take account of the costs to the employee of health risks by virtue of being confronted with a demand for a risk premium; the employee is required to take account of the costs to the employer of investments in safety precautions by virtue of being offered a lower wage.

II. Market Failure

Real world markets do not, of course, work with anything resembling the virtuosity of that depicted in the foregoing idealization. The absence of the necessary conditions for perfectly functioning markets results in markets which are monopolistic (one seller), oligopolistic (few sellers), or monopsonistic (one buyer); in which there are significant barriers to entry; in which there is product differentiation (qualitative differences in the product from seller to seller); in which there are information asymmetries between seller and buyer; in which transaction costs preclude effective bargaining; and in which there exist externalities or spillover effects of economic transactions. These various forms of "market failure" undermine the optimality characteristics associated with the operation of perfect markets and the economic

framework then countenances the possibility of government intervention to correct for these market failures.

The importance of the perfectly functioning market model in the conventional economic framework is not to suggest that it depicts reality but rather to suggest a benchmark by which the performance or likely performance of real-world markets and possible regulatory interventions therein can be evaluated. Thus, in an economic efficiency framework, the goal of policy ought to be to attempt to replicate, by regulatory intervention where necessary, the outcomes of perfectly functioning markets -- in the present context, by minimizing the sum of the cost of health hazards and the cost of safety precautions.

With respect to the health hazards associated with asbestos and other toxic substances, certain forms of market failure are likely to be more pronounced than others. In the case of asbestos-related health hazards in schools or public buildings, the absence of any contractual relationship between the parties subject to the hazard and the owner of the building, and the absence, typically, of readily available alternative suppliers of the services in question, render it unlikely that user interests will be able to register effectively their preferences for safety/risk with the source of the hazard (i.e., an external cost is generated by construction or maintenance decisions with respect to these buildings which no market mechanism exists to take account of).

With respect to labour markets, imperfect information about health risks to which employees are subject makes it unlikely that contractually determined levels of safety and risk will be optimal. This is not to suggest that wage rates in labour markets are insensitive to risk factors. As Rea points out, if we knew that each worker would give up \$1000 in annual earnings to lower the probability of death by .001 per year (one worker out of a thousand), a thousand workers would pay \$1,000,000 to save one worker per year. By examining the difference in wage rates for different levels of occupational risks of death, a number of authors have determined the implicit value of life. Estimates tend to range between \$420,000 and \$2.5 million (1979 Canadian dollars). Empirical studies on the relationship between injury rates and wage rates have yielded less clear results with some studies showing no statistically significant compensating wage differential for risk of injury.¹

Whether labour markets generally accurately adjust wage rates to reflect risks is highly problematic. Even where information on the distribution of risks of certain eventualities is available, psychological and related studies suggest some common biases in the perception of risk. For example, there is some evidence that people refuse to worry about events whose probability is below some threshold. This tendency is particularly accentuated where the event falls outside the personal experience or observation of the risk-bearer. Thus the probability of relatively rare events will be underestimated because few workers observe the event.

On the other hand, once such an event has been observed, there may be a tendency to overestimate risks. For example, when drivers observe the consequences of a particularly serious accident beside the highway, there is an observed tendency for drivers to slow down for a period thereafter out of concern to avoid similar events befalling themselves, even though the accident that has been observed has not changed underlying probabilities. Along similar lines, there seems to be a prevalent belief that a very small sample provides evidence of the underlying population. In the case of occupational safety, this would lead to exaggeration of the underlying risks of small companies that have experienced accidents. Conversely, the risk would be underestimated if no accident occurred.² Moreover, even if the risk is correctly estimated with respect to a particular job (or product), this information is often only helpful when related to risks associated with alternative jobs (or products) in the light of other terms of exchange is likely to tax the information processing abilities of most individuals. This realization has provoked a good deal of recent literature on "bounded rationality" (limitations on the capacity of human beings to process and react to information rationally), and attempts to determine how individuals reach decisions in the face of extreme complexity.³ In Herbert Simon's "satisficing" model of individual decision-making under uncertainty,⁴ individuals set "aspiration" levels

for themselves with respect to some parameter of their welfare and adopt rules of thumb for monitoring and evaluating information on a certain small number of key variables to determine whether that level is being attained. If these variables prove seriously unreliable indicators of goal attainment, adjustments will be made to them through a process of sequential decision-making. This model of individual decision-making in the face of complexity stands in contrast to that implied in the economic model of a perfectly functioning market where economic agents maximize an objective function (individual welfare) by rationally evaluating⁵ and comparing all alternative choices.

To this point we have assumed that information on the underlying distribution of risks is available but difficult to "process," leading to widespread misperceptions of risk. Divergences from the optimality conditions implied by the perfectly functioning market model are likely to become even more pronounced when information on the underlying distribution of risks is not available. In the case of asbestos, the unavailability, at this point in time, of reliable scientific evidence on dose-response relationships illustrates this kind of uncertainty. The absence of information on the risks of health hazards from long exposure to low levels of asbestos particles does not mean that individuals will necessarily discount this risk altogether. However, forming useful judgements as to whether an appropriate discount factor is being applied to this uncertainty is almost, by definition, impossible.

The presence of both complexity and uncertainty therefore drive the performance of real world labour markets, in allocating and reducing health risks, away from the perfectly functioning market paradigm. It might, of course, be argued that the seriousness of this divergence can be overstated if an excessively static framework is adopted for evaluating the performance of labour markets with respect to levels of occupational health and safety. For example, to the extent that employers must pay any risk premium at all reflecting health hazards, there will be an ongoing incentive to invest resources in learning more about the hazards with a view to developing improved safety technology that costs less than the risk premium. Similarly, employees faced with both complexity and uncertainty with regard to health risks have an ongoing incentive to invest resources in investigating whether, from their point of view, the levels of safety and risk in a plant are optimal and in incorporating new information in revisions to wage demands or employment decisions. Apart from individual time and energy that might be invested in these activities, another investment that might be rational is in attempting to co-ordinate the generation, acquisition, and assimilation of information amongst employees through some form of concerted action, thus realizing any scale economies entailed in these processes.

While acknowledging that these dynamic forces in a market may lead to continuous adjustments to, and probably improvements in, its

performance with respect to health and safety over time, other forces are at play that are likely to ensure that an optimum is never reached. On the employer's side, there are strong disincentives, where risk is being underestimated by employees, to the generation or disclosure of new information about levels of risk where these are higher than presently perceived. Third parties also do not have adequate incentives to produce such information, because the public goods character of this information prevents a supplier from capturing all the social benefits associated with its dissemination once it has been generated. Employees in turn face difficulties in pooling their resources in collective "search" activities because transaction costs and free rider problems create organizational disabilities in "large numbers" situations.

At this juncture, externalities, information costs, and to a lesser extent transaction costs have been identified as potent sources of market failure with respect to health hazards associated with asbestos and similar toxic substances. A much less pervasive source of market failure may on occasion be monopsony in a labour market. In the prototypical "one company town" where job-specific skills and geographical isolation severely inhibit relocation decisions, current employees may face difficulties in negotiating optimal levels of safety and risk (as defined by the perfectly functioning market model) in the light of new information

on health risks as it becomes available. However, it probably remains true that the employer will, at some price in terms of wage reductions, be prepared to invest resources in reducing these health risks.

Assuming that all the monopsony returns are already being exacted from employees in terms of lower wages, new information on health risks may, in some limited sense (if one assumes the continued existence of the monopsony), lead to an efficient adjustment in wages, safety precautions, and risk. In other words, it is not clear that monopsony will yield lower safety levels for employees rather than lower net benefits generally from employment.

In summary, health hazards faced by users of public buildings and public schools cannot be the subject of any compensating risk premium in the absence of the necessary contractual relationships and cannot on purely economic grounds (in contrast perhaps to political grounds) be regarded as appropriately incorporated into the safety/risk calculus of decision-makers responsible for the construction and maintenance of these buildings. Employees in labour markets have some ability to demand compensating wage premiums from employers for health risks assumed (and thus to face employers with the expected social costs of these risks), but this ability is likely to be impaired by imperfections in information about these risks induced by the inherent complexity and uncertainty surrounding them. Closely similar informational considerations are also likely to impair the efficient functioning of product markets with respect to

health hazards associated with given products. The impact of monopsony on safety/risk levels in labour markets is problematic and may arguably produce similar levels (although lower net benefits from employment) to those prevailing in competitive markets.

III. Correcting For Market Failure

Given these various forms of market failure, the conventional economic prescription would be some form of collective intervention to correct for these forms of market failure and hopefully replicate the outcomes that a perfectly functioning market would have produced (in the present context, with respect to safety/risk levels). However, just as economics has developed a theory of market failure so, in recent research on regulation, has it been led to evolve a theory of non-market failure. Importantly, from a welfare-maximization perspective, the same factors that impair the efficient functioning of markets tend also to impair (to a greater or lesser extent) the efficient functioning of regulatory processes.

Even assuming that the regulators are motivated exclusively by a desire to maximize social welfare (in terms of safety/risk levels) as defined by the perfectly functioning market model described above, major technical difficulties afflict attempts to replicate these welfare outcomes. While these will be investigated more fully when each of the major policy instruments available is evaluated in later sections of this paper, the general form of these difficulties can usefully be identified at this point.

Obviously, to replicate the outcomes of perfectly functioning markets, regulators-- whatever the policy instrument chosen-- need to know the underlying marginal cost and marginal benefit functions associated with investments in safety precautions in order to make judgements about the effectiveness of a given instrument in advancing this welfare objective. Knowledge of these two functions is crucial to effective regulation of both labour markets and externalities of the kind to which users of public buildings and schools are subject.

Recalling the diagram used earlier to depict the safety/risk optimum in the perfectly functioning market paradigm, regulators face the task of estimating the true nature of employees' and users' marginal benefit functions even though, by definition, their true preferences cannot be revealed-- in the case of employees because of imperfect information, and in the case of users because of the absence of any market in which to register their valuations.

In the case of employees, the assumption must be that regulators, by processing information about risks (where these are known), and by investing resources in reducing uncertainty (where risks are not known), can do so more efficiently than employees; by forecasting reactions of employees to this information, had it been available to them, regulators can arrive at the true marginal benefit function of employees, that is, that function which employees would themselves have arrived at had they possessed this information. In one sense, therefore, regulators can be viewed as agents acting for employees in

performing these information generation, processing and evaluation functions. This would seem ultimately to be the case whatever the instrument under review. For example, if government chooses to deploy a policy of subsidizing the generation and provision of information about health risks to employees, the effectiveness of such a policy can only be judged, within an economic framework, by reference to how close it moves market interactions to the perfectly functioning market paradigm, which necessarily assumes knowledge of the true marginal benefit function of employees. The effectiveness of other policies such as civil liability regimes and public standard-setting require similar judgements.

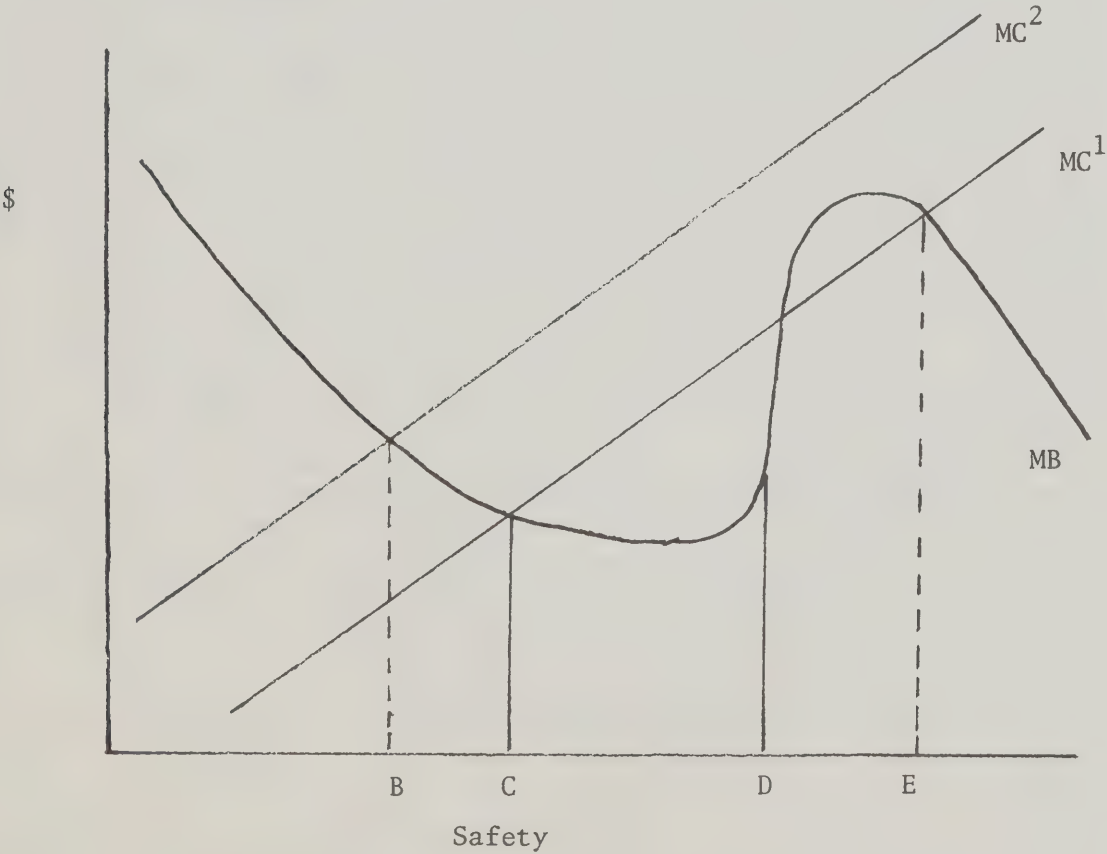
In constructing these notional marginal benefit functions, regulators face similar information processing problems to those faced by individual employees. For example, the economic (welfare maximization) framework requires that all risks associated with all substitute jobs (products) be evaluated because the demand for safety is in part a function of safety levels prevailing with respect to substitute jobs or products.

Assuming relative risks can be determined, regulators then need to know what valuations employees place on the consequences of these risks and what their taste for risk is in order to establish a schedule of expected damage costs (or conversely expected benefits from increased safety precautions). When employees have highly heterogeneous tastes for risk, regulators, as their "agents," face major difficulties in determining what set of risk preferences should be adopted in the

objective function of the regulators. The valuation issue is particularly intractable when loss of life is one of the possible consequences from assuming a certain risk. Attempting to extrapolate valuations of life by transferring data on implicit risk premiums in one job setting to another involves highly arbitrary assumptions. As Zeckhauser points out, "the people who are assuming the risks [in the settings sought to provide the analogies] may be those who value them least in relation to the benefits they get for risking them: they may be the poor, they may be the people whose probability assessments are most in error, they may be the people who legitimately have the lowest probability of being injured, they may be people who will die soon anyway, or they may be the people who value their own lives the least highly."⁷

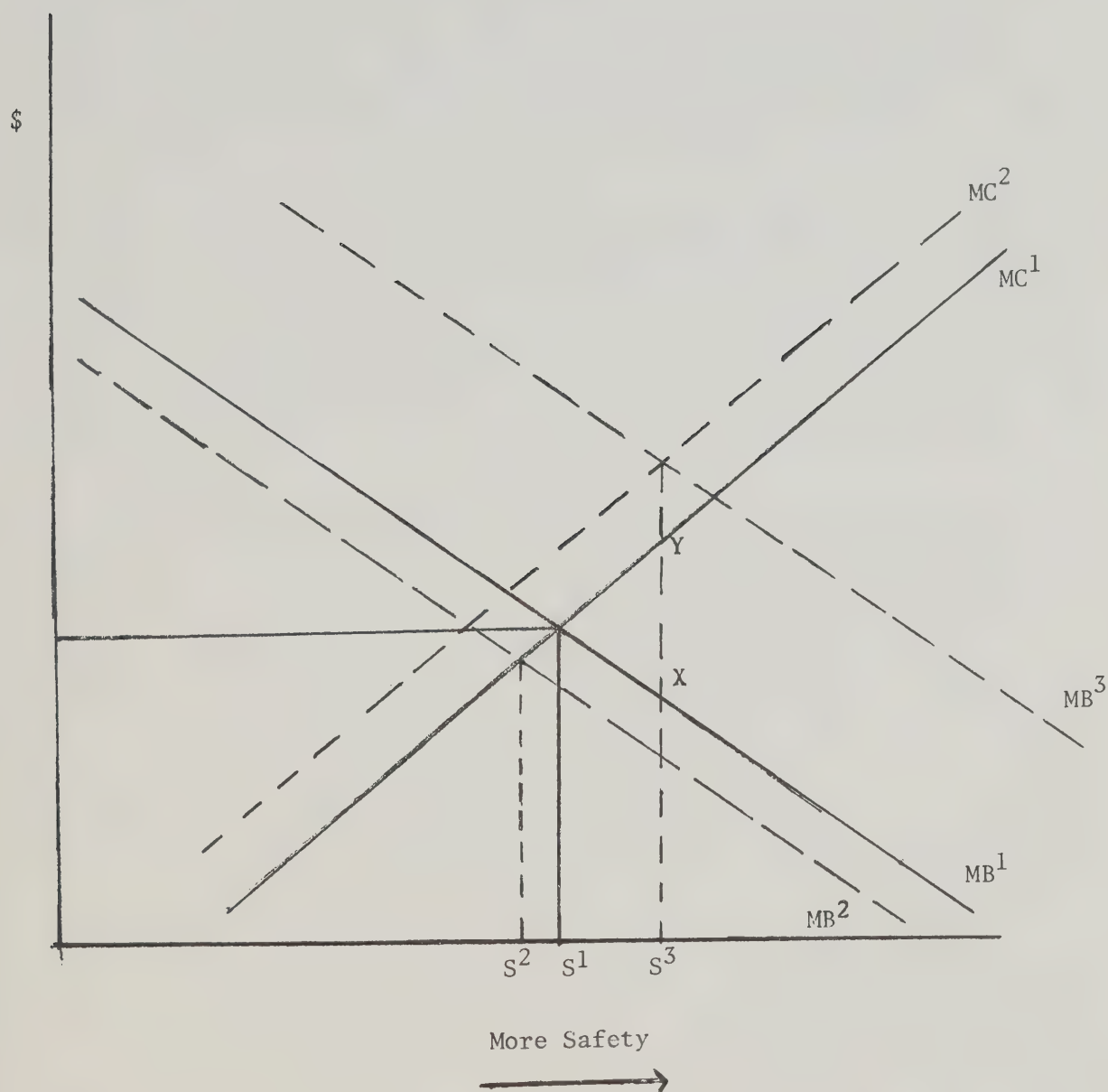
So far, the problems of constructing a notional marginal benefit schedule for increased investments in safety precautions have been sketched. Measurement problems of comparable difficulty also exist with respect to determining the true marginal cost schedule for increased safety precautions. In addition to incentives that employers have to avoid generating or disclosing information on health risks (which may affect the nature of the marginal benefit schedule), firms also have incentives to exaggerate the costs of taking further safety precautions. Where the least-cost precautions involve self-protective measures by employees, and misperceptions of risk persist, employees may also have incentives to exaggerate the costs (e.g., discomfort) associated with taking these measures. Given the complexity of the technological issues frequently involved in evaluating hazard abatement options, regulators face a daunting task in determining the true nature of the marginal

cost schedule. The importance of determining the true nature of the marginal cost function is particularly critical where the marginal benefit function is non-linear. For example, as depicted in the diagram below, for a given investment in hazard abatement, a marked reduction in the incidence of asbestosis can be achieved (C). Further investments in hazard abatement secure declining (and lesser valued) health benefits until a new threshold is reached (at D) where particular concentrations are reduced to the point where they cease to cause, for example, carbon monoxide poisoning, with a sharp increase in marginal benefits from abatement occurring as this threshold is crossed. However, if the regulators are led to believe (falsely) that the marginal cost function for abatement is not MC^1 but MC^2 , not only will there be a sub-optimal reduction in the incidence of asbestosis but the mesothelioma threshold will be missed completely. The extent of the error is reflected by the distance between B and E on the safety axis.⁸



Errors in the determination of the nature of either or both of the marginal cost and marginal benefit schedules will preclude the social safety/risk optimum defined by the perfectly functioning market model from being attained. At least in theory, errors of sufficient magnitude may create a more serious divergence from this optimum than that obtaining in the unregulated market. In the case of labour markets, where a bargaining relationship exists between the parties, this divergence could leave one or both sets of parties worse off than before intervention and a fortiori much worse off than the social optimum. Obviously, any form of intervention is likely to affect the wage/safety/risk mix. Any increase in safety is likely to be reflected in a reduction in explicit wage benefits derived by employees. Thus, the costs of error (if any) will be internalized (at least initially) to employer and employees. The next diagram depicts the following scenario. Because of underestimation of risk, employees believe (incorrectly) that the marginal benefits of investments in safety precautions are shown by MB^2 , producing S^2 amount of safety (a sub-optimal amount). In fact with full information, the marginal benefit schedule would be perceived as MB^1 , producing S^1 amount of safety (the socially optimal amount). The regulators believe that the misperception of risk is much more serious than in fact it is and construct a notional marginal schedule, MB^3 . They are also led to believe by employers (incorrectly) that the marginal costs of safety precautions are greater (MC^2) than is in fact the case (MC^1) (a partially offsetting error), yielding an amount of safety, S^3 , which is socially excessive. Employees suffer a welfare loss,

measured by the distance between X and Y (the difference between the true marginal benefit and marginal cost functions at S^3); is presumably reflected by a reduction in wages which employees would prefer not to suffer given the lesser value placed on further risk reductions.



Closely similar difficulties confront regulators seeking to achieve Pareto-optimal levels of safety/risk with respect to hazardous products, where again the existence of contractual relationships involves similar welfare implications in terms of regulatory error as depicted above.

In the case of externalities (e.g., public buildings, schools), essentially the same analysis applies to the tasks facing regulators seeking to achieve Pareto optimal outcomes although here safety gains may be realized by one class of persons by imposing costs on another class of persons. In the case of occupational health hazards, in contrast, we have assumed that the cost of increased safety for employees was largely borne by the employees themselves in the form of lower wages. Regulators pursuing policies that impose costs on some in order to generate benefits for others in search of a Pareto optimum face a special problem in determining whether such policies are welfare-maximizing.

The Pareto rule holds that any social change is desirable which results in everyone being better off, or someone being better off and no one being worse off, than before the change. As to the meaning of "better off" and "worse off" in this formulation, a theoretical definition of efficiency in a Pareto sense would hold that "a proposed change is efficient if, after negotiated compensations have been promised by those who stand to gain from the proposal to those who stand to lose by it, the proposal can win unanimous

approval. For the 'losers,' by expressing their willingness to accept the change as long as they receive a certain amount of compensation testify that they will, under such conditions, be conscious of no net loss in welfare; while the gainers, by expressing their willingness to pay the same amount of compensation, testify that the change will yield benefits to them which are worth more to them (in dollars) than the losers' losses are worth to them (in dollars)."⁹

Any departure from this definition of efficiency (or welfare-maximization) will entail interpersonal welfare comparisons in which the gains to some must be weighed against the costs to others from a proposed change. Given the highly subjective nature of individual preferences (or satisfactions), it has generally been assumed as central to welfare economics that individual welfare positions are incommensurate. The problem is not overcome by adopting a common unit of measurement such as dollars, because one cannot assume that a dollar will generate the same amount of welfare (or utility) for one person as another.

This has been one of the major critiques of benefit-cost analysis. While it may be true, as a matter of theory, as Kaldor, Hicks and others¹⁰ have argued, that compensation need not actually be paid in order to determine whether it is possible, by a given change, to make some people better off while leaving no one worse off, individual welfare functions cannot in practice be revealed to an outside observer short

of the process of unanimous agreement postulated in the definition of efficiency set out above. Given that such a process of collective decision-making is not the one we have chosen and could not be operationalized, even remotely, in any event, benefit-cost analysis arguably leaves us imposing an arbitrarily chosen social welfare function on all the affected parties.

Throughout the foregoing discussion of problems that confront regulators seeking to correct for market failure with respect to levels of safety and risk, it has been assumed that the regulators were exclusively motivated by a concern to maximize the welfare of all affected parties. If this assumption is relaxed so that the policy goal of the legislators remains welfare maximization but that regulators, bureaucrats and others involved in the implementation and administration of the regulatory policies include private objectives with this objective in their utility functions, predicting the likelihood that a given policy will be effective in attaining a Pareto optimum becomes even more difficult than the analysis has hitherto suggested.¹¹ For example, if regulators/bureaucrats have limited incentives to contain administrative costs (and indeed positive incentives in terms of pay, power, and prestige to increase them), the actual social costs of implementing higher safety standards may be greater than the social benefits warrant. Similarly, if regulators/bureaucrats perceive themselves as likely to sustain greater personal career risks by setting standards too low (with some highly visible human costs) rather than too high (where social costs are likely to be dispersed or obscured), there may be a bias towards requiring standards of safety that involve social costs in excess of any social benefits generated thereby.

All of this is to say that the economic framework (i.e., the welfare maximization paradigm) is a very uncertain and imprecise normative guide to determining the nature of the social optimum with respect to safety/risk; how seriously given markets diverge from that optimum; and how well given regulatory interventions are likely to replicate that optimum. Thus, economic analysis, as a normative guide to the framing of policy objectives in this area, is subject to some severe limitations.

However, it bears pointing out that economics, as a form of positive analysis of impacts or likely impacts of given policies, assuming that the objectives of those policies are independently given, may have much greater value. For example, if it were to be decided, on whatever grounds, that highway fatalities each year in Ontario should be reduced by 30%, economic analysis is likely to be able to offer some important insights into whether given policies are likely to achieve that target, at what social cost, and with what form and scale of impact on other policy objectives. Whether these costs and impacts are worth bearing, given the objective, would be a matter for independent social judgement, lying outside the domain of this form of positive economic analysis. In deciding among policy instruments, however, knowledge of the relative scale of these costs and impacts from one instrument to another may be highly relevant to the social judgements to be made.

Notes to Chapter 3

1. Samuel Rea, "Regulation of Occupational Health and Safety," in Quality Regulation, ed. Donald N. Dewees (Toronto: Butterworths, forthcoming), pp. 12-15.
2. Ibid., pp. 5-7; E. MacKaay, Economics of Information and Law (Montreal: Groupe de Recherche en Consommation, 1980), chapter 6.
3. Ibid.
4. Herbert Simon, Administrative Behaviours, 3rd ed. (New York: Free Press, 1976).
5. See further on this model of decision-making, John Steinbruner, The Cybernetic Theory of Decision: New Dimensions of Political Analysis (Princeton, N.J.: Princeton Univ. Press, 1974).
6. Victor Goldberg, "Regulation and Administered Contracts," Bell Journal of Economics 7 (1976): 426; "The Economics of Product Safety and Imperfect Information," Bell Journal of Economics 5 (1974): 683.
7. Richard Zeckhauser, "Procedures for Valuing Lives," Public Policy 23 (1974): 419.
8. This example is adapted from Brian A. Ackerman, Susan Ackerman, James Sawyer and Dale Henderson, The Uncertain Search for Environmental Quality (New York: Free Press, 1974), p. 766.
9. Frank Michelman, "Property, Utility and Fairness: Comments on the Ethical Foundations of Just Compensation Law," Harvard Law Review 80 (1976): 1165 at 1173, 1174.
10. For a review of compensation theories in welfare economics, see Maurice Dobb, Welfare Economics and the Economics of Socialism (Cambridge: Cambridge Univ. Press, 1969), chapter 6.
11. See e.g., Charles Wolf, "A Theory of Non-Market Failure: Framework for Implementation Analysis," Journal of Law and Economics 22 (1979): 107.

CHAPTER 4 THE POLITICAL FRAMEWORK

I. Modes of Political Decision-Making

From a political perspective, the problem presented by the asbestos issue is the need to respond to competing demands for action (or inaction) with a policy which will be supported by an effective coalition of affected interests. The effectiveness of a coalition can be defined in negative terms: an effective coalition removes potentially crippling vetoes which might thwart either the development or the implementation of the policy. Given the number of points in the political system at which vetoes (or at least delaying tactics in many cases equivalent to vetoes) can be exercised, the building of an effective coalition of support is considerably more difficult than is the crippling of a policy. Furthermore, the building of effective coalitions in particular policy areas must be accomplished in the general context of maintaining or extending the base of political support for governmental policy-makers themselves. These complex decisions must be taken in the context of considerable uncertainty, not only regarding technical aspects of policy but regarding constituency preferences.

Political modes of decision-making in the context of such uncertainties may differ in important ways from the scientific and economic frameworks which we have been discussing. Scientific and economic decision-making is modelled essentially upon an analytic paradigm, in which it is assumed that complexity and uncertainty can best be dealt with through the comprehensive organization of information: by arraying all relevant and available data and preferences for consideration. Taken together, science and economics support an analytic approach to policy-making which proceeds by explicitly comparing the probable costs and benefits (measured, with varying degrees of quantitative precision, in terms of

all relevant values) of a range of alternative policies, and choosing the alternative with the greatest expected net benefit. Such an approach would operate on the basis of a causal "blueprint" of the environment¹ and would provide for the ongoing collection and processing of information to improve that blueprint.

Much political decision-making proceeds along analogous analytical lines -- although the relevant values for the measurement of political costs and benefits often differ from those brought to bear in scientific or economic decision-making. But there is another mode of political decision-making, owing more to intuition and habit than to logic and calculation (and, some decision theorists would argue, closer to the processes which characterize the preponderance of decision-making activities of everyday life). This alternative approach occurs within what might be called a "cybernetic"² decision-making paradigm. Within this paradigm, it is assumed that complexity and uncertainty are best dealt with not through the comprehensive organization of information but through selective attention: by attending only to certain critical variables which are to be kept within an acceptable range, or to certain sources of information -- as identified by an integrated belief system.

Let us consider how "analytic" and "cybernetic" political decision-makers respectively are likely to approach questions of public policy.

A. Analytic Politics

Analytical political decision-making involves a rough cost-benefit calculus, weighing the costs of formulating a policy (costs of information about technical aspects of the issue and about preferences of affected interests; the transaction costs of negotiating a winning coalition and co-ordinating institutional authority) against the benefits to be gained from rewarding strategic groups and hence ensuring their support for the policy and more broadly for the policy-maker either individual or collective.

In this optimizing process, political decision-makers are more likely to be cost-minimizers rather than support-maximizers. That is, they will seek to negotiate the least costly winning coalition,³ conferring no more benefits than necessary to ensure the success of the policy or the continued maintenance of a position of power. "Winning big" (building up excess support) may be seen to be necessary in some circumstances -- where there are great uncertainties about preferences and demands and a margin of safety is desired, for example, or where a big win is seen as necessary to chill future challenges. In general, however, political policy-makers are assumed to be sensitive to the opportunity costs of investing political resources in any given issue area, and prefer to invest resources in achieving minimum effective coalitions in a number of areas rather than building excess support in any one.

From the policy-maker's point of view, the political costs and benefits of public policies are influenced by the interaction of two sets of variables: one dealing with the configuration of political demand, the other with the nature of the system of authority through which the policy must be developed and implemented.⁴ To the extent that demand is "fragmented" among intensely interested and competing groups, negotiating costs are increased and the "exchange value" of a decision (the sum of its positive and negative values to groups strategic to the support of the policy or the policy-makers) is difficult to calculate. Conversely, to the extent that demand is integrated and uniform, transactions costs are reduced and exchange values clearer. Furthermore, to the extent that demand is diffuse, poorly informed, and poorly articulated, the potential cost bearers and beneficiaries of public policies face transactions costs of their own in informing themselves of the likely effects of policy and in mobilizing in support or opposition.

In such circumstances, the exchange value of a policy is enhanced if its costs can be disguised and its benefits communicated in simple terms.

The nature of the policy development and implementation system involves the distribution of authority and information. As Pressman and Wildavsky have pointed out, the probability of implementing a policy is geometrically decreased by an increase in the number of clearance points through which it must pass (unless these points are hierarchically or otherwise integrated)⁵. The costs of mobilizing institutional authority through a non-hierarchical system of clearance points may be substantial. Furthermore, the cost of reaching a decision may be substantially increased by a dispersion or absence of relevant technological information within the policy development and implementation system.

Different types of policies are likely to result from the interaction of these variables on the demand and supply side of public policy. In particular, the higher the cost of decision-making, the greater the likelihood that the first policy response will be a modification of the decision-making structure itself, involving the delegation of the decision-making authority to some specialized agency which possesses or can develop a comparative advantage in accessing relevant information, mobilizing or exercising institutional authority and negotiating a coalition of support.⁶

Where demand is highly integrated -- where there is only one intensely interested, highly organized, and active pressure group -- power is likely to be effectively delegated to that group itself through the establishment or the explicit or implicit recognition of a self-regulatory structure. Such a strategy reduces the direct cost of decision-making by transferring the decision-making function to an agency whose internal information and negotiating costs are less than those in the legislative and bureaucratic arenas, while conferring substantial benefits upon the only significant constituency of demand and support. (Much professional

regulation falls into this category.) At the other extreme, where information and negotiating costs in the legislative and bureaucratic arenas are high and demand is intense but diffuse, poorly articulated, and fragmented among a large number of competing pressure groups and unorganized constituencies, the response is likely to be to seek a symbolically "impartial" and disinterested decision-making agency. Where the costs of decision-making are primarily information costs, the tendency will be to establish "expert" specialized agencies within the administrative apparatus of the state (as in the case of food and drug regulation). Where the costs are primarily those of mobilizing institutional authority, the tendency will be to establish agencies representing political and/or bureaucratic arenas or to go outside the legislative and bureaucratic altogether to require a judicial response. Such strategies provide relatively well-integrated decision-making systems while conferring at least initially a symbolic indication of concern in response to diffuse demand.

Between these extremes, and hence more likely to occur in reality, are situations in which relatively well-articulated and competing demands are expressed by relatively few organized and active pressure groups. In such cases, the symbolism of impartiality is not likely to have sufficient exchange value to ensure support for the policy or the policy-maker. Decision-making authority is likely in such cases to be delegated to an agency or set of agencies (subject to the constraint of increasing numbers of clearance points) incorporating representatives of a minimum effective coalition of affected interests.

Whatever the "demand" and "supply" conditions which influence the choice of policy options, one must not lose sight of the fact that the instrument selected itself shapes subsequent political behaviour. Much recent political scientific literature, elaborating upon the significant insights of Theodore Lowi and of political economists such as

James Q. Wilson, Mancur Olson, Anthony Downs, and Gordon Tulloch, has attempted to trace out the effects of policy on politics. Lowi and his numerous re-interpreters have focused on the nature of coercion involved in various policy types to explain their effects on subsequent political activity. The political economists' approach focuses on the degree to which policies concentrate on diffuse costs and benefits.

Lowi argues that policies can be distinguished along two dimensions,⁷ each relating to the nature of the coercion involved. The first involves the extent to which coercion is directly applied (as when fines are levied) or indirectly applied (as when subsidies are financed through the general revenue system). The second dimension involves the trigger mechanism. The application of coercion, either directly or indirectly, must in some cases be triggered by individual behaviour (as when the individual applies for a subsidy, or transgresses some prescriptive rule of behaviour). In other cases, policies establish incentives, prescribe specific behaviour, or allocate tangible benefits without an individual trigger.

Without entering into a critique of Lowi's analysis, which is problematic in a number of respects, it is worth extracting several of its implications. The two dimensions of coercion which he identifies are significant because they affect the degree to which winners and losers from a policy are specifically identified and drawn into face-to-face relationships with each other and with policy-makers, and the extent to which they are made aware of the coercive presence of the state. Policies which differ in these respects are likely, as we shall argue in more detail in a later section, to have different effects on the character of the relationships among affected interests and policy-makers.

There is another aspect of public policies (at best implicit in Lowi's analysis) which shapes political behaviour -- that is the extent to which

those policies concentrate or widely distribute their costs and benefits. It is this aspect which has received most attention from the political economists. The public choice school of political economy has been concerned largely in this respect with the problems of political mobilization where costs or benefits are widely distributed,⁸ and with two corollary effects: the political attractiveness to policy-makers of policies which allow them to disguise transfers by adopting policies whose costs are widely spread;⁹ and the implementation difficulties of policies whose costs are concentrated and whose benefits are widely distributed.¹⁰

Without presenting all of the possible permutations and combinations of factors identified by Lowi and the political economists, it is worth noting some general propositions which can be derived from their approaches:

- (i) Policies which create concentrated and identifiable groups of winners and losers provide the basis for confrontation, usually requiring resolution at the central points of the political system. Where both winner and loser groups are relatively small, focus is likely to be (at least in parliamentary systems) at the cabinet level. The larger the groups, the greater the likelihood of ideological and party based conflict through the legislature and the electoral process.¹¹
- (ii) Policies which create a concentrated, identifiable group of losers and a diffuse group of winners provide the basis for a politics of minority veto and obstructionism through the bureaucracy and the courts, avoiding broad political forums in which the larger group of winners might be mobilized.¹²
- (iii) Policies which create a concentrated group of winners and a diffuse group of losers provide a basis for a politics of bargaining and log-rolling among winners and potential winners at the

13

bureaucratic level, again avoiding broad political forums.

- (iv) Policy instruments which draw affected groups and policy-makers into face-to-face contact with each other
14
 enhance the likelihood of bargaining.

B. Cybernetic Politics

Cybernetic theorists argue, in effect, that although the above patterns of political response may well be observed, it is because political systems have "learned" over time that such policies are successful responses to certain cues, and not because cost-benefit ratios are explicitly calculated in each situation. The system responds to changes in the cues (but not to changes elsewhere in the field of activity) by selecting from a limited repertoire of learned and valued responses. No explicit prediction of outcomes, no marginal tradeoffs of values are made in this model. Value conflicts are handled, not by maximizing a utility function, but by pursuing different values seriatim or by re-defining the problem to deny the existence of value conflicts.

The separate pursuit of conflicting values occurs in part through a process whereby the problem is decomposed into relatively simple sub-problems which must be hierarchically re-integrated. "Standard operating procedures" characterize the lower levels of these cybernetic hierarchies,
15
 and "sequential attention to goals" the upper levels. On this basis,
16
 the problem-solving process can operate on the basis of a "recipe," not a "blueprint," and provides for learning, on a trial-and-error basis, what works but not why it works.

The resolution of conflicting values without making explicit marginal tradeoffs can also occur, within the cybernetic paradigm, because the structure is imposed on complex problems not by analysis but by cognitive inference. The cognitive principles of reinforcement (and the weight of information in memory), of the seeking of consistency and stability

in perception, and of social concurrence shape the development of the belief systems within which new information is interpreted.¹⁷ But these belief systems themselves are subject to change, on a number of levels, with persistent changes in the shaping influences or in incoming information. Persistent value conflicts, then, will lead not to explicit marginal tradeoffs but to adjustments to the belief system -- including ceasing to consider one or more values.

Such an understanding of political decision-making, its proponents claim, explains phenomena which would be considered "mistakes" within the analytic paradigm -- such as the persistence of past behaviour patterns even when the configuration of demand and support has changed. An incumbent government, for example, may attend to demand only from those constituencies which have been sufficient to ensure its support in the past, and may fail to perceive strategic changes in demand and support. Responding only to its learned "cues" on the basis of its limited repertoire, it may lose power to another set of policy-makers who respond to different cues and maintain a different repertoire.

Similarly, cybernetics accounts for the tendency for values and preferences to be attached to various aspects of the policy-making process itself, apart from its outcomes. Certain policy instruments or methods of procedure may be preferred because they accord with ideological predispositions, ethical values, or established routine. On a somewhat related note, it may well be that much of the activity which is assumed in the analytic paradigm to entail "transaction costs" is not unambiguously costly to participants. The process of negotiating agreement, although it consumes time and energy which could be put to other uses, may also entail a good deal of psychic gratification for political entrepreneurs. These aspects of political decision-making suggest that the analytic framework should at least be modified to incorporate "procedural" preferences (as

Simon did some years ago in suggesting that policy-makers choose preferred¹⁸ "behavioural alternatives" rather than means to preferred outcomes).

A more fundamental criticism of the analytic paradigm is that it ignores the stuff of much political activity: the shaping of preferences. Analytic political decision-making essentially takes preferences as given, although it does allow for "propagandizing." (It allows, that is, for deliberate attempts by policy-makers, faced with inchoate or uncertain consistency preferences, to shape or change those preferences.¹⁹) Cybernetics has much to contribute to an understanding of how such propagandizing is likely to operate (through ideological appeals which simplify complex calculations and define away tradeoffs, for example). More importantly, however, cybernetics suggests that preferences are shaped primarily not through conscious manipulation on the part of analytic decision-makers, but as an intrinsic part of a process of political interaction and mutual accommodation among interests in the search for an acceptable policy. Preferences are shaped in the policy-making process, as the participants²⁰ "learn what to like."

More or less explicitly, cybernetic theorists argue that the adaptation of political systems to their environments over time is a result of strategies such as those briefly canvassed in this section. A system which operated within an analytic paradigm would ultimately succumb to miscalculation, conflict, and the sheer burden of continually performing cost-benefit calculations.

In fact, it is likely that both analytic and cybernetic paradigms influence political decision-makers, and that the degree of their influence varies with individual decision-makers and with different types²¹ of decision and decision-making conditions. While we are far from an understanding of the relative strengths of the two paradigms in varying circumstances, it is reasonable at least to expect that a cybernetic mode will tend to predominate to the extent that preferences are volatile and uncertain.

II. The Pattern of Demand for Policies Regarding Health Hazards

With the general background presented in the previous section, we can proceed to consider the political factors likely to influence the choice of policy responses to the asbestos issue in Ontario. Among these factors are the configuration of political demand and support, and, on the "supply" side, the information resources, institutional structure, ideological complexion, and repertoire of policy responses of the governmental system.

We shall, in this section, attempt to sketch out the general configuration of demand and support-- the mobilization of interests, and the ideological climate -- in the health hazard arena. The roles played by various interest groups and ideologies will, however, vary according to whether the focus of concern is the workplace, public buildings, or the general environment; and we shall make reference to these differences throughout the following discussion.

A. The Politics of Prevention

The configuration of demand and support for public policy relating to asbestos, and to other health hazards, is probably best seen within the context of an emerging, and still volatile and fluid "politics of
22
prevention."

Since at least the mid-1940's, the Canadian health policy arena has been dominated by the politics of medicine: the struggle over the role of the public sector in distributing the policies and benefits of a burgeoning medical technology. The primary actors have been the providers of hospital and medical care and the governments who have assumed in large part the costs of that care. Ideologies have pitted property rights in technology against entitlements to service (or at least to access to service). The primary forums, given that the producers and consumers of medical care are quite conscious of their status and that the stakes of each in the issue of access to care are substantial, have been

the central and visible organs of governments: legislatures, cabinets, and federal/provincial conferences.

During the 1970's, however, another set of issues, with its attendant politics, began to gain in prominence. While the politics of medicine still dominate the arena, the politics of prevention is increasing in relative importance. There are a number of forces behind this emergence, forces in some tension with each other. One of the major forces has been an increasing concern with the cost of medical care, in an era of increasing public concern about the size of government expenditures generally. Government spending on health care is relatively large and visible: in 1976, for example, it accounted for 12.6 percent of total government spending.²³ Although expenditures on medical care did not escalate disproportionately during the 1970's, medical inflation outpaced that in the economy generally. It has been persuasively argued in both the academic literature²⁴ and the popular media that, while governments have not been paying disproportionately more (or less) for medical care, their citizens have been getting less. Controlling inflation and hence costs in a labour intensive industry such as health care, however, means reducing the rate of the increase in the incomes of providers. Policy options such as changing the incentives facing providers by shifting from fee for service to capitation or salary, or re-ordering the production function to place increasing weight on facilities less costly than acute care hospital beds and personnel less costly than physicians are continually advocated by commissions of inquiry; but such options threaten the strategic coalition of providers whose support is essential to the maintenance of an exceptionally popular governmental programme. Pilot projects with health service organizations and nurse practitioners almost invariably reveal public support for such methods of health care delivery; but political mobilization in support of such options is at present limited to a "radical" segment of the medical profession itself, and those labour- and welfare-

oriented groups which include health care reform as an item of fairly broad political agendas.

As Crawford has put it in a somewhat different context, "simple political calculation discourages policy-makers from bothering too much about reforms which would require a political realignment which²⁵ presently does not exist."

Rather, government policy-makers appear to be taking two approaches to holding increases in government expenditures on health care below the rate of medical inflation without incurring public dissatisfaction with the level of medical care. One has been to attempt to shift part of the cost burden back to the private sector through utilization fees or by allowing physicians to "extra bill" their patients above the level of government insurance benefits. Such strategies, however, have been²⁶ unpopular, at least at the level of public opinion.

A second strategy has been to attempt to change preferences, to decrease demand for medical care, by embarking on a campaign of "health promotion" -- by propagandizing the public that, "less medical care is not²⁷ equivalent to less health."

The primary Canadian example of this approach, which has received considerable international attention, is the so-called Lalonde document²⁸ of 1973 which emphasizes that medical care technology and organization are only two of the factors promoting health, the others being lifestyle and environment. Government health promotion campaigns themselves have generally focused on lifestyle as opposed to environmental factors. Environmental threats to health are endemic to the functioning of the political economy of modern industrial states. Changes in individual lifestyles, however, can occur without wrenching political and economic realignments. (While the consumption of alcohol and tobacco confer substantial economic benefits on both private industry and

governments, they nonetheless involve relatively discrete industries. The pursuit of fitness programmes, moreover, appears to have spawned a rising new industry!) The lifestyle emphasis appears to have received an enthusiastic public reaction, perhaps in part because it provides individuals with a sense of control over their own health in an environment increasingly perceived as uncertain and threatening. And even if lifestyle changes are not brought about, at least the emphasis on their importance shifts the burden of blame for health care expenditures.

The increasing emphasis on disease prevention and health promotion in the health care arena, then, stems at least in part from an attempt by policy-makers, facing uncertainty about political preferences, to avoid jeopardizing their established bases of political support while responding to diffuse but mounting demands for cost control. Ironically, however, this policy direction in the health care arena has met with and reinforced a political phenomenon considerably more threatening to those traditional bases of support (and particularly to corporate interests demanding a decreased governmental fiscal and regulatory presence) -- that is, an increasing concern with occupational and environmental health hazards. Although, as we noted in our discussion of the scientific perspective, lifestyle arguments have been used to minimize the assessment of risk from environmental factors, the two have not been kept distinct in public perception. By focusing attention on "health promotion," governments have fuelled environmental controversies as well.

B. Organized Interests in the Health Arena

The politics of environmental protection embrace a wide variety of "environments" from workplace to wilderness, and a variety of aesthetic as well as health-related concerns. The major organized interests -- industry, labour, "citizens' lobbies," and their respective professional allies -- are similar in most of these contexts; but the

intensity of their concern, the degree of mobilization of their members, their access to relevant information, their willingness to forge alliances, and the extent of their public support will vary somewhat according to whether the hazard at issue occurs in the general environment, public buildings, or the workplace. Most notably, the workplace arena evinces the greatest degree of organization of contending interests. Nonetheless, the political dynamics of this loosely related set of concerns tend to be somewhat similar and mutually reinforcing. In Canada, these dynamics have been heavily influenced by events in the United States.

In the United States, advocates for environmental and occupational health interests have been successful in placing issues of health hazard control relatively high on the political agenda. But despite their success, the configuration of demand and support for policies in this arena has not solidified. In large part, this stems from the difficulties of sorting out the gains and losses entailed in various forms of health hazard control.

1. Industrial Interests

Almost all occupational and environmental health measures involve changes in production processes, changes which are likely to increase costs per unit of output. In some cases, such measures have triggered technological innovations which allow for the recapture and use of material previously discharged into occupational and general environments, offsetting a large part of the cost of control.²⁹ Furthermore, industry enjoys potential benefits from occupational health measures in the form of increased worker productivity through decreased absenteeism and disability.

Widely ranging estimates of such costs and benefits have characterized the political debate over occupational and environmental health. As we shall see, demands for cost benefit analysis have constituted an important part of industry's strategy of resistance to changes in production

processes. (This strategy is preferred for a number of reasons: it delays change; it favours the use of resources, such as cost information and technological expertise, largely commanded by industry; and it tends to emphasize costs, which are relatively easy to express in dollar terms, over benefits, which are not.)

Whatever the costs, they are likely to be largely borne by industry in the first instance, and the ability of industry to pass those costs along to consumers or back to employees depends upon the particular characteristics of the product and labour markets. And there is little doubt that industrial interests perceive themselves as substantial net losers from occupational and environmental health measures, given the intensity of their efforts through lobbying and litigation to delay the effect or weaken the impact of control measures in the United States.

2. Environmental Interests

There is no similarly concentrated constituency of perceived beneficiaries from occupational and environmental health measures. The breather of purer air may also be the consumer or taxpayer who bears the cost of pollution control devices, or the worker whose wages are held down or whose job vanishes with the employer's flight to a pollution haven. The ambiguity of such wins and losses has had a number of political effects.

In order to emphasize widespread wins rather than widespread losses from environmental protection politics, "citizens' lobbies" or "public interest" groups have relied heavily on ideology and symbolism. They have appealed to pastoral and wilderness imagery, and to an ideology which McFarlane has described as one of "civic balance." This ideology simplifies the complex calculations of wins and losses by making several assumptions: it assumes, in effect, that in the environmental policy area concentrated benefits accruing to the elites who control the policy process almost always generate widely diffused losses (and vice versa);

and that mobilization of diffuse interests is necessary to balance the power of those with concentrated stakes. As McFarlane puts it:

The elements of the civil balance system of beliefs are these: the political system is seen as complex, fragmented into numerous areas of policy; such policy areas are often controlled by unrepresentative elites, however, who act to further their own special interests to the detriment of the interest of the great majority of the public; such public interests frequently go unrepresented in policy making, either because public interests, such as those of consumers, are inherently hard to organize, or oligopolies or bureaucracies, acting singly or in combination, defeat those agencies working "in the public interest"; hence, there is a need for citizens to organize into groups and participate in the political process in order to balance the power of the special interests.³⁰

In addition to this ideological appeal to diffuse interests, environmental activist groups have sought financial and political support among sets of individuals whose losses from environmental exploitation are relatively concentrated. It has been suggested, more or less derisively, that the predominantly college-educated, middle-class complexion of groups such as Common Cause and the Sierra Club implies a lobby of individuals with the means, tastes, and leisure to be "consumers of undeveloped wilderness" operating behind a public interest facade.³¹ As Downs has put it, "to regard environmental pollution as a purely external negative factor would be to ignore its direct linkage with material advantages most citizens enjoy... the elite's environmental deterioration is often the common man's improved standard of living."³² Although this characterization rests on shaky empirical ground,³³ and borders on caricature at some points,³⁴ it does capture some of the political bases of the environmentalist movement. Where perceived losses are concentrated, not in a particular group of middle-class consumers, but in a geographic area of high-population density (highly frequented public buildings such as schools may fall into this category as well), there may also be potential for political mobilization. But even in such cases, the local source of pollution is often also a significant source of local employment or service.

In the U.S., the tactics of environmental activists have focused on the building of ad hoc coalitions with congressmen, journalists, agency officials, and other pressure groups, as well as the extensive use of "public interest litigation." In Canada, where institutional arrangements make both ad hoc coalition building among legislators and bureaucrats and public interest litigation considerably more difficult, such concerns have also found an outlet in an electoral vehicle: the New Democratic Party. The NDP's association with labour has fostered its concern for the workplace environment (see below), and its ideological distrust of concentrated corporate power (particularly multi-national corporate power) has led it to pursue a number of instances of industrial discharge of toxic substances into the general environment. Hence, the pressing of issues of environmental (and occupational) health hazards in Canada has been somewhat more tied to the agenda of a political party than has been the case in the U.S.; but the debate is still heavily influenced by media coverage of U.S. activists.

3. Labour Interests

In the case of organized labour, we can observe a somewhat similar set of political dynamics characterized by problems of sorting out costs and benefits, and related problems of political mobilization.

It cannot be assumed, as some commentators do, ³⁵ that workers perceive themselves as unambiguous winners from controls on occupational health hazards. Unlike safety regulations, controls on health hazards may be of dubious perceived benefit to workers with relatively long histories of exposure to such hazards (unless such controls are accompanied, as they have not been in the past, by substantial compensation to already exposed workers). Such controls may be seen as likely to threaten jobs and hold down wages by increasing production costs, and to publicize the

impaired health status of exposed workers, hence reducing their opportunities for alternative employment. Health hazards may therefore not be identified by workers most heavily exposed, although organized labour may respond to hazards once identified, in defence of the interests of potentially or lightly exposed workers. Furthermore, as the actual cost of compliance becomes clearer through the process of policy development and implementation, the perceived threat to jobs and wages may decrease, and labour's support may become firmer.

It is not surprising, then, that organized labour has not in the past been an agenda-setter regarding health hazards in the workplace, either in Canada or the U.S. (although in Canada labour's political ally, the NDP, has assumed this role). In the U.S., the initial identification of health hazards, and pressures for control, have come largely from groups associated with but outside organized labour, from environmental interest groups, or from within government agencies. Unions themselves have tended to react to proposals once formulated and to provide political support for control measures once established. Kelman reports that the impetus for the consolidation and strengthening of occupational safety and health legislation developed within the federal administration in the late 1960's; the role of organized labour (like that of business) was largely reactive.³⁶ Moreover, the unions appear to have provided a political constituency of support for the Occupational Safety and Health Administration only since about 1977. In the six-year period prior to that point, they adopted a stance critical of OSHA's alleged slowness in policy development and failures of enforcement. To some extent the burden of identifying and pressing for tightened controls on workplace health hazards has fallen upon professional groups sympathetic to organized labour, such as the American Public Health Association and more particularly the relatively recently established Society for Occupational and Environmental Health.

Such groups, with a heavy academic component and with links to consumer and environmentalist groups, exist in considerable tension with industry-oriented professional groups such as the Society of Toxicologists and the American Council of Governmental Industrial Hygienists.

In Ontario, as noted, the major vehicle for the expression of concern regarding matters of occupational health and safety has been the New Democratic Party. In the mid-1970's, in the context of a minority government, the Ontario NDP leader persistently pressed the Conservative government to take action on occupational health and safety. This pressure resulted in the appointment of the Ham Inquiry into the Health and Safety of Workers in Mines, and ultimately in The Occupational Health and Safety Act in 1978. By 1976, organized labour was lending increasing support to this crusade: the United Steelworkers staged a "health walkout" at the newly established Matachewan asbestos mine, and the Canadian Labour Congress produced a major policy statement on occupational health and safety,³⁷ emphasizing its concern with toxic substances. This concern has been relatively recent, however, and the commitment of research and staff resources to occupational health issues³⁸ has been slow.

The response of organized labour in Quebec to the health hazards posed by asbestos is a particularly good example of the workers' dilemma. Restricted in occupational mobility by the phenomenon of the company town (and, presumably to some extent by impaired health status), asbestos workers have historically concentrated their collective efforts on "bread and butter" issues. Only in 1975 was the first attempt made to insert an occupational health provision in a collective agreement -- a provision which was bargained away in return for the establishment of a governmental inquiry into health hazards in Quebec asbestos mines (the Beaudry Commission).³⁹

C. Public Opinion

The competing perspectives and interests of producers and consumers of

manufactured goods, consumers of air, water, and natural beauty, employers and workers, and the professional allies of each of these groups have given rise to ideological currents and tensions which can be sensed and to some extent measured at the level of public opinion. Canadian public opinion data in this area are unfortunately thin. U.S. data have suggested general public support in the order of 52 percent for occupational health and safety regulation (with 12 per cent opposed and the remainder undecided), while only 35 per cent of workers believe such regulation to be important to them. Support for environmental protection regulations is considerably stronger: poll data suggest that about 70 percent of the adult population both favours environmental protection regulations and deems them personally important.⁴⁰

This support for controls on workplace and environmental health hazards exists in the U.S. despite the recent popularity of a "deregulatory" ideology in that country. The freezing of all regulations, the character of recent appointments to regulatory agencies, and the proposals to relax standards under the Clean Air Act now generating substantial conflict in Congress indicate a strong ideological commitment and political will within the federal administration to deregulate; and the American example could well strengthen similar ideological currents in Canada. Indeed, the ideological tensions currently playing about the revisions to federal occupational health and safety legislation have been apparent in the rhetoric of the Hon. Gerald Regan, the federal labour minister, in separate addresses. In one, he stated that "the politically fashionable cry for deregulation cannot be allowed to distract us from making workplaces safer." In another, however, he spoke approvingly of deregulation and, employing an increasingly popular means of reconciling an increased regulatory presence with a deregulatory ethos, advocated a more self-regulating occupational health and safety system.⁴¹ In general, one should not over-emphasize the impact

of this "politically fashionable cry" in Canada, particularly, given the entrenchment of regulatory instruments in the political economy of this country. It is, however, likely to have an impact on political rhetoric and symbolism, and may lead to attempts to "streamline" regulatory instruments through omnibus legislation, consolidation of inspectorates, and reduction in paper burden.

D. The Issue Attention Cycle

At all levels, then -- specific interests, public opinion, governmental policy-makers -- political thinking about health hazards is characterized by ideological tension and conflicting preferences. And one way in which the political system has attempted to deal with these contradictions is not to attempt to confront or resolve them but to attempt to deal with issues and preferences sequentially. This cybernetic strategy has resulted⁴² in what Downs has termed the "issue attention cycle."

Downs elaborated his concept of an "issue attention cycle" in the context of a discussion of policies related to pollution in the general environment. It is nonetheless, as we shall suggest shortly, of some help in thinking about the political dynamics of more narrowly defined environments as well. As Downs describes it, the cycle has five stages. Paraphrasing and elaborating on his insights, we can describe the cycle as follows. In the first, or "pre-problem" stage, an undesirable condition exists (usually in more severe form than at any other point in the cycle) but has not yet come to public attention. Those most directly affected may or may not have defined it as a problem, and accordingly identified a route, however obstructed, to its solution. The second stage Downs terms "alarmed discovery and euphoric enthusiasm," and is the period in which the condition is called to public attention by some dramatic event, or by the happenstance of issue selection by political partisans or journalists. At this stage, the problem is defined

in such a way that it can allegedly be solved without any fundamental social, political, or economic re-ordering, often by seeking a literal deus ex machina -- salvation through technology.

In the third stage, focus shifts to the costs of solving the problem -- either the opportunity costs of the technological and money resources involved, or, more fundamentally, the social and political costs of altering zero sum relationships. As Downs puts it "our most pressing social problems... usually involve either deliberate or unconscious exploitation of one group in society by another, or the prevention of one group from enjoying something that others want to keep for themselves."⁴³ In the fourth stage, public attention begins to face, as a result of discouragement, suppression of thinking about threatening issues, or boredom. Attention begins to shift to other issues now entering stage two. Finally, the fifth or "post-problem" stage constitutes a "prolonged limbo" in which an issue receives spasmodic attention, usually because an institutional framework has been created to deal with the problem in earlier stages and persists after the waning of public attention.

E. The Workplace, the General Environment, and Public Buildings

Downs argues that the issues most likely to go through the issue attention cycle are those involving the amelioration of conditions which impose relatively concentrated costs upon some numerical minority of the population while generating significant benefits for a majority or a powerful minority, and which are not inherently dramatic. He analyzes the case of environmental pollution within this framework, and concludes that it is likely to go through the cycle more slowly than others. This is true for several reasons: because the costs of environmental pollution (as well as the benefits of the relationships generating it) are relatively widespread; because some forms of pollution are visible and dramatic; and because proposed technological "solutions" abound. But, he argues, the issue will eventually go through the cycle because any solution must ultimately entail a fundamental (and by implication politically unacceptable) re-ordering

of political and economic power.

Extending this analysis to the cases of health hazards in the workplace or in public buildings, one might expect issues to move through the cycle at rather different rates. In the case of the workplace, passage through the cycle might be relatively faster, since the costs of exposure to a workplace hazard are likely to be concentrated upon relatively few workers, while the benefits of the production process in question accrue to industrial interests and consumers (and even, in the form of jobs and wages, to the workers themselves). Public opinion polls showing stronger support for environmental than for workplace controls, then, should not surprise us -- workplace issues may have passed more quickly to a "third-stage" focus on the costs of control, and public policy must now be shaped in that context.

In the case of public buildings, there are few political forces to propel a health hazard issue past the second stage of "alarmed discovery." In such cases, a hazard imposes costs upon a small, diverse, and unorganized segment of the population -- frequenters of the building -- but the condition can in many cases be ameliorated through technological solutions which do not deprive powerful or large groups of benefits to which they have become accustomed. In the case of asbestos, what is usually involved is the removal or encapsulation of a product already purchased and installed. Apart from some temporary disruption of activity within the building, ongoing production process and jobs are not directly threatened (indeed, some employment is generated). The money costs of removal or encapsulation, furthermore, are widely spread across the tax base. There are, indeed, few political forces among either potential beneficiaries or cost-bearers to trigger action in this arena alone. The public buildings arena, however, overlaps with both the occupational and the general environmental arenas; public buildings house a more or less constant group of employees; and in addition

the potential responses -- the removal and disposal of asbestos -- entail risks to workers and environmental interests. Issues which arise in the context of public buildings may well be dealt with politically in these related arenas.

Schools present a special case within the public building category. Here the frequenters of the building are not a casual and diverse group -- they are well-defined, and their interests evoke a strong paternalistic concern. The costs of risk reduction are still likely to be thinly spread, and public action is hence likely to be precipitated while the issue is still in the stage of alarmed discovery, and before attention has shifted to costs.

In short, the asbestos issue in Ontario appears now to be phasing from the second to the third stage of Downs' cycle; but this process is occurring at a different rate in the arenas of the workplace, the general environment, and public buildings. Certainly exposure levels were much higher during the "pre-problem" stage in the period up to the 1960's. The public's "alarmed discovery" and growing awareness of asbestos as a health hazard can be attributed largely to the efforts of occupational health activists in the United States, "imported" into Ontario largely through the NDP. (For example, Dr. Irving Selikoff, a leading American asbestos researcher and occupational health activist, was consulted at several points by the Ontario NDP leader at the time of the Matachewan controversy and addressed an Ontario NDP convention in June, 1976.) Public awareness was heightened in Ontario by several dramatic events: the 1976 Matachewan "health walkout," and the 1979 mesothelioma death of a carpenter whose asbestos exposure had occurred in Toronto schools. With the appointment of the Royal Commission on Asbestos, and the dramatic escalation in the costs of removing or encapsulating asbestos in Toronto schools, attention has already begun to shift to the costs of asbestos control. The activity and report of the Commission will maintain attention at this stage for some time.

The shift to concern with the costs of control is somewhat out of phase in the various environments in which asbestos hazards arise, however --

with the result that from an economic if not from a political viewpoint there is likely to be some misallocation of investment in risk reduction. For example, if, as in the schools case, action is likely to be triggered in the state of alarmed discovery, while in the workplace arena the cycle moves rapidly to a focus on costs before action can be taken, the political process will favour investment in the former area over the latter, regardless of where marginal investments in risk reduction would yield the greater marginal health benefits.

Finally, it should be noted that even as the asbestos issue passes into the final stages of the cycle, it will be recalled from limbo rather frequently, as the identification of a range of health hazards extends the debate over whether occupational and environmental health hazards are "worth" their cost.

Indeed, it is important to recognize that there is a larger cycle of interest and attention for the general issue of health hazards -- within which there is a series of cycles relating to particular hazards. This series prolongs the life of the general issue but complicates the policy response. In the workplace and the general environment, threats to health, each affecting a somewhat different numerical minority of workers and of the general population, become apparent at different times. Sequential attention to those threats prolongs the life of the issue of environmental and occupational health, but the fact that different groups are beneficiaries or cost bearers of different hazards at different times provides bases for log-rolling and for institutional fragmentation, which in turn substantially increase the negotiating costs of reaching a decision.

III. The Supply of Policies: Ideology, Institutional Capacity, and Institutional Fragmentation

So far, we have been dealing with the demand for policies related to asbestos hazards; it is now appropriate to consider briefly the factors

One such constraint is the ideology of the party in power. In the context of a majority cabinet government, this can be a powerful constraint, at least in the short-term; and where the issues involved do not affect marginal constituencies whose withdrawal of support could change the legislative balance of power⁴⁴ it is likely to be determinative. The case of asbestos, however, is part of the larger issue of health hazards which has formed the basis for considerable inter-party competition for marginal voters in Ontario in the recent past. At the legislative level, then, the ideology of the governing party may not be a major constraint, although it may affect the vigour of enforcement.

The question of enforcement raises as well a concern with institutional capacity -- the resources, in dollars, manpower, and information within government to develop and implement policies, as well as the "standard operating routines" which have characterized the governmental bureaucracy. These questions are treated much more extensively in other studies⁴⁵ prepared for the Commission. Let us simply note here that the most common instrument for the regulation of health hazards in the general and occupational environments in Canada has been the development of standards, drawn heavily from international sources, and established as administrative guidelines or, less commonly, as regulations. The enforcement process, generally under-resourced, has relied heavily upon "voluntary" compliance,⁴⁶ encouraged by an accommodative enforcement style. More recently, the occupational arena has seen, in most Canadian provinces, the growth of "internal responsibility" systems based upon joint worker-management⁴⁷ committees. This system is reviewed in other Commission studies.

Related to the question of institutional capacity is the problem of institutional fragmentation. Such fragmentation is one of the major effects of the issue attention cycle, as different issues and even different

aspects of issues are assigned to different agencies in the context in which they come to attention. Problems of divided institutional responsibility for environmental and occupational health in both the U.S. and Canada have been the subject of extensive commentary in both academic literature and government policy documents. The institutional framework for public policy with respect to asbestos and other health hazards in Canada is set forth and analyzed in other studies prepared for the Commission,⁴⁸ and we shall attempt here only to sketch the broad dimensions of the complexity involved.

In the U.S., two major initiatives to consolidate responsibility for the regulation of the workplace and general environments respectively culminated in 1970 in the establishment of the Occupational Safety and Health Administration within the Department of Labor and of the Environmental Protection Agency, with departmental status of its own. As a result, institutional authority in these matters is remarkably integrated at the federal level, and the major fault lines are provided by federal-state relations. The history of the EPA in particular has been one of continual political contention and litigation over federal-state jurisdictional issues.⁴⁹ To the extent that the jurisdictional struggle favours state control (as it promises to do under the current administration), inter-agency fragmentation at the state level further compounds decision-making costs.

In Canada, institutional responsibility for policies relating to hazardous substances in the general and occupational environments is fragmented not only between federal and provincial governments but within both levels of government. The Ham and Beaudry Commissions noted earlier observed that jurisdictional conflicts among provincial

government agencies and departments in both Ontario and Quebec created, by default, situations in which industry was enabled essentially to regulate itself.⁵⁰ A number of governments have attempted to consolidate legislative occupational health and safety provisions, and the responsibility for their administration; Saskatchewan's 1972 occupational health and safety legislation and Ontario's 1978 legislation are examples, as are the consolidation of occupational health and safety provisions and the revisions to Part IV of the Canada Labour Code currently underway at the federal level. Furthermore, the creation of environment ministries and omnibus legislation at both federal and provincial levels has to some extent consolidated intra-governmental responsibility for administering legislation regarding various general environmental media. Such consolidations do not extend to formal co-ordination of policy relating to the general and the occupational environments, nor do they deal with the relationship of such policies to governmental responsibility housed elsewhere in the administration, such as the regulation of food, drugs, and consumer products.

Furthermore, these intra-governmental consolidations do not directly address inter-governmental problems. Few formal mechanisms of co-ordinating federal and provincial policies regarding occupational and environmental health exist, although there are some very broadly phrased federal and provincial accords in the environmental area, and there have been some proposals to incorporate federal guidelines by reference in provincial legislation.⁵¹ It is arguable whether intra-governmental consolidations and formal mechanisms of inter-governmental co-ordination have a positive or negative effect on inter-governmental relations. Although there is a certain face attractiveness to the proposition that the reduction of the number of contact points may reduce

the negotiating costs and facilitate the resolution of inter-governmental conflict, the U.S. experience suggests otherwise. It has been argued, indeed, that while OSHA and EPA in the U.S. have promulgated relatively stringent regulations which they have not been able to enforce, the less stringent but more enforceable "guidelines" developed in the Canadian system have been at least as effective in objective terms.⁵² Jurisdictional conflict in Canada has been handled less through formal consolidation than through the delegation of substantial discretion to administrative officials who then negotiate enforceable positions with each other and with those who must comply.

IV. Conclusion

Government policy-makers in Ontario currently face a diffuse demand for the control of environmental and occupational health hazards, of which asbestos is the most current example. In part this demand stems from a general concern (partly governmentally induced) with preventive health measures in the face of higher than average inflation rates in the curative medical care industry. In part it arises from media attention to the agenda-setting and maintaining activities of environmental and occupational health activists in the U.S. and to certain dramatic events at home. The demand, however, is volatile and its configuration uncertain, particularly as public perception moves from "alarmed discovery" of health hazards to the costs of their control. In addition to this diffuse, uncertain, and volatile demand, governments also face a powerful constituency of industrial interests whose markets and production processes are potentially threatened by environmental and occupational health measures. The power of this constituency derives from its degree of organization, its command of economic, technological, legal, and information resources and its strong ideological support in the political culture of the province. The benefits of occupational and

environmental health measures are not similarly concentrated -- at least not in the initial perceptions of relevant groups. Organized labour has only recently come to press for legislative standards, and even here it is not clear that the rank and file perceives such measures as unambiguously beneficial. Environmental activist groups have generally been less salient in Canadian than in U.S. politics, although the degree of their mobilization and activism is increasing. To a large extent, the role of environmental and occupational health advocacy and agenda-setting has fallen to an opposition party, the NDP, forging links with U.S. professional and citizen lobby spokesmen.

These political factors vary somewhat in the different environments in which asbestos hazards arise. In the occupational arena, the costs and benefits of hazard control are most concentrated, and, not surprisingly, the mobilization of interests furthest advanced. The extent of the political mobilization, and indeed the nature of the preferences, of the potential beneficiaries of risk reduction -- organized and unorganized workers -- are uncertain and probably changing.

In the arena of the general environment, the benefits of risk reduction are more widespread and diffused. "Citizens' lobbies" representing environmental interests draw political strength from media attention and from support in public opinion, but their political legitimacy as advocates for widespread environmental interests on concrete issues has not been established. And the ability or desire of labour and citizens groups to forge alliances in this arena is very uncertain. The first signs of such a formal coalition are appearing in the U.S.;⁵³ but substantial difficulties in such coalition building are inherent in an arena in which the costs of environmental risk reduction can be passed back to workers.

In the arena of public buildings, the political forces are rather different. Here both the benefits and the costs of risk reduction are typically widely spread over diverse and unorganized groups -- the frequenters of the building, and taxpayers, respectively. Setting aside the special case of schools, and given the lack of interest group organization in this arena, issues of asbestos hazards in public buildings are likely to be dealt with politically in the occupational and environmental arenas, the link being the interests of employees in those buildings and of those involved in or affected by removal and disposal operations.

In summary, governments are faced (to a greater or lesser extent in the contexts of the workplace, the general environment, and public buildings) with fragmented, diffuse, and shifting demands for policy responses to asbestos hazards from the potential beneficiaries of risk reduction. In addition (at least in the contexts of the workplace and the general environment), they face a well-organized set of industrial interests who perceive themselves as bearing the concentrated burden of the costs of risk reduction. Governments also face high decision-making costs: high information costs are entailed in coming to grips with complex and controversial scientific and technological evidence relating to health hazards, and high transaction costs are entailed in mobilizing fragmented institutional authority in response.

In the circumstances which pertain in the occupational and general environmental arenas, political science would suggest that governmental responses will focus on symbolic and structural change, delegating to an issue-specific body the tasks of generating relevant information, mobilizing institutional authority, and negotiating with affected interests. (The need for negotiation is greater to the extent that these affected

interests are politically mobilized or possessed of effective vetoes over the implementation of a policy -- and is hence greatest in the occupational arena.) In the first instance, this body may be one lacking formal decision-making authority such as a commission of inquiry.

In fact, this emphasis on structural change is just what we have observed in Canada, with the appointment of the Ham and Beaudry Commissions and the present Royal Commission on Asbestos in Ontario, the establishment of the Advisory Council on Occupational Health and Occupational Safety and with the periodic establishment of inter-governmental and inter-ministerial task forces specific to particular occupational and environmental health issues. As the demand for tangible responses persists, however (as factors noted earlier prolong the attention cycle for health hazards and relevant interests become increasingly mobilized), governments are likely to take up more coercive fiscal or regulatory instruments. In that process, considerations similar to those behind these initial structural changes are likely to favour the choice of an instrument which entails the exercise of substantial discretion by the administering agency, while providing a symbol of control.

The delegation of discretionary standard-setting authority to a specialized agency is consistent not only with a rough calculation of the political costs and benefits of various policies in the present context, but also with the ideology and traditions of the Ontario government. The propensity to grant broad discretionary powers to specialized agencies at both federal and provincial levels in Canada has been extensively documented.⁵⁴ Diffuse demand for "protection" from potentially hazardous substances, circumstances, or services has traditionally provided the cue for governments to delegate authority

to officials to negotiate protective measures with those who control the relevant production processes.

In summary, political forces in the health hazard arena in Ontario favour a policy response which has a strong symbolic connotation of risk reduction, while providing sufficient discretion at the administrative level for specific policies to be negotiated with those interests who are capable of obstruction or support. As demand for health hazard control continues to coalesce into organized opposing groups, the focus of negotiation is extending from industrial interests to include organized labour and perhaps environmental citizens lobbies. Increasingly it may be necessary to guarantee formally the negotiation process through procedural or representational arrangements.

Each of a range of policy instruments can be assessed against these political criteria, and against the underlying considerations outlined in this chapter. In so doing, it is important to remember one final point: the choice of policy instrument is not only shaped by political forces, but also alters political activity itself. The existence of a specialized standard-setting agency, for example, may favour a politics of bargaining and (depending on the scope of participation) log-rolling among groups; judicial remedies may favour more adversarial relations and more individualized conflict. Before turning to a discussion of specific options, however, let us consider one more evaluative framework: the perspective of ethics.

Notes to Chapter 4

1. H.A. Simon, "The Architecture of Complexity," in H.A. Simon, The Sciences of the Artificial (Cambridge: MIT Press, 1968).
2. Numerous attempts have been made to capture distinction between these two decision-making modes, from Lindblom's original distinction between "synoptic" and "disjointed" and (implicitly) non-rational approaches, to Lindblom's latest distinction between "synoptic" and "strategic" decision-making and Wildavsky's contrasting of "cogitation" and "interaction." See C.E. Lindblom, "The Science of Muddling Through," Public Administration Review (Spring 1959): 79-88, and Politics and Markets (New York: Basic, 1977), pp. 314 ff.; Thomas R. Dye, Understanding Public Policy (Englewood Cliffs: Prentice-Hall, 1972); Yehezkel Dror, Public Policy Making Reexamined (San Francisco: Chandler, 1968); Aaron Wildavsky, Speaking Truth to Power: The Art and Craft of Policy Analysis (Boston: Little Brown, 1979). None of these labels captures the distinction we wish to make, since each of the two paradigms sketched here can be seen in its own terms as rational, strategic, and even interactive. The analytic-cybernetic distinction is found in John Steinbruner, A Cybernetic Theory of Decision (Princeton: Princeton University Press, 1974), although Steinbruner himself prefers to use the label "cognitive" for the paradigm which incorporates a cybernetic processing of information within the structure of a belief system. See also S. Beer, The Brain of the Firm (London: Penguin, 1972); Alan Schick, "Toward the Cybernetic State," in Public Administration in a time of Turbulence, ed. D. Waldo (New York: Chandler, 1971).
3. This point is made and relevant literature discussed in Norman Frohlich and Joe A. Oppenheimer, Modern Political Economy (Englewood Cliffs: Prentice-Hall, 1968), pp. 76ff. For a classic treatment, see William H. Riker, The Theory of Political Coalitions (New Haven: Yale, 1962).
4. R.H. Salisbury and J.P. Heinz, "A Theory of Policy Analysis and Some Preliminary Applications" (Paper delivered at the Annual Meeting of the American Political Science Association, Washington, D.C., Sept. 2-7, 1968).
5. Jeffrey Pressman and Aaron Wildavsky, Implementation (Berkeley: University of California Press, 1973), pp. 102ff.
6. The likelihood of a "structural" response given high decision-making costs is noted in Salisbury and Heinz, op. cit. note 4.
7. Theodore Lowi, "Decision Making vs. Policy Making: Toward an Antidote for Technocracy," Public Administration Review (May/June 1970), and "Four Systems of Policy, Politics, and Choice," Public Administration Review (July/August 1972).
8. Mancur Olson, The Logic of Collective Action (Cambridge: Harvard University Press, 1965); James Q. Wilson, Political Organizations (New York: Basic, 1973).

9. The argument that political decision-makers seek policies whose costs can be hidden or imposed upon relatively less strategic constituencies has been made in M.J. Trebilcock, D.J. Hartle, J.R.S. Prichard, and D.N. Dewees, The Choice of Governing Instrument: Some Applications, Regulation Reference, Technical Report No. 12 (Ottawa: Economic Council of Canada, 1981), pp. 21ff; A. Myrick Freeman III and Robert H. Haveman, "Clean Rhetoric Dirty Water," The Public Interest (Summer 1972): 63; Joyce M. and William C. Mitchell, Political Analysis and Public Policy (Chicago: Rand McNally, 1969), chapter 5.
10. Wilson, op. cit. note 8, at p. 333.
11. Ibid., pp. 334-5; see also the articles by Lowi cited at note 7 supra.
12. Robert B. Reich, "Warring Critiques of Regulation," Regulation (January/February 1979); 42; Freeman and Haveman, op. cit. note 9. Such obstructionist tactics may be unnecessary, however, if the cost-bearing group can "capture" the administering agency. Wilson, op. cit. note 8, at p. 333ff.
13. Reich, op. cit. note 12, at p. 42; Wilson, op. cit. note 8, at p. 333ff.
14. This point seems to be implicit in Lowi's arguments as developed in the articles cited at note 7, supra.
15. R.M. Cyert, and J.G. March, A Behavioural Theory of the Firm (Englewood Cliffs: Prentice-Hall, 1963).
16. Simon, op. cit. note 1.
17. Steinbruner, op. cit. note 2, at pp. 88-124; See also R. Axelrod, The Structure of Decision (Princeton: Princeton University Press, 1976).
18. Herbert Simon, Administrative Behaviour, 3rd ed. (New York: Free Press, 1976), chapter 5.
19. See, for example, Gary Becker, "A Theory of Political Behaviour," (Paper delivered at the Law and Economics Workshop, Faculty of Law, University of Toronto, October 22, 1981).
20. Aaron Wildavsky, Speaking Truth to Power: The Art and Craft of Policy Analysis (Boston: Little, Brown, 1971).
21. One of the best known demonstrations of this multi-model approach to the understanding of policy development is Graham Allison, The Essence of Decision (Boston: Little, Brown, 1971).
22. Robert Crawford, "Cancer and Corporations," Society (March/April 1981): 20-25.
23. Richard Bird, "The Public Finance of Health Care," in "Commentaries on the Hall Report," Ontario Economic Council Discussion Paper, mimeographed (Toronto: January 1981).
24. Ibid.
25. Crawford, op. cit. note 22, at p. 22.

26. Limited but consistent evidence from public opinion polls in Metropolitan Toronto suggests widespread public opposition to "extra-billing" by physicians. "69% want M.D.'s back in OHIP," Toronto Star, 8 May 1980; "58% want doctors to end extra-billing," Toronto Star, 12 January 1981.
27. Crawford, though writing in a U.S. context, specifically cites Canadian policies as examples of this strategy. Op. cit. note 22, at p. 22.
28. Canada. Department of National Health and Welfare, A New Perspective on the Health of Canadians (Ottawa: 1974).
29. See, for example, the discussion of the recapture of perchloroethylene and vinyl chloride through risk-reduction technology in Robert N. Harris, Robert B. Nicholas, and Paul Milvy, "Reducing Environmental Risks," Society (March/April 1981).
30. Andrew S. McFarland, Public Interest Lobbies (Washington: American Enterprise Institute, 1976), pp. 8-9.
31. Ibid., pp. 4-5, 42.
32. Anthony Downs, "Up and Down with Ecology: the Issue-Attention Cycle," The Public Interest (Summer 1972): 44.
33. McFarland, for example, speculates that the members of citizens' lobbies are likely to be disproportionately drawn from the white, middle-class, college-educated population, on the basis that this characterization applies to U.S. political activists generally. He also reports an international Common Cause survey in 1974 which revealed that the Massachusetts members of that "citizens lobby" had an average family income of \$20,000 [an income level which at the time marked the approximate threshold of the upper quintile of the U.S. income distribution]. McFarland, op. cit. note 30, at p. 3.
34. "As they say in Colorado, a conservationist is a person who built his mountain cabin last year, while a developer is someone who wants to build his mountain cabin this year." Lester Thurow, The Zero-Sum Society (New York: Basic, 1980), p. 23.
35. Steven Kelman "Occupational Safety and Health Administration," in The Politics of Regulation, ed. James Q. Wilson (New York: Basic, 1980), p. 256.
36. Ibid., pp. 240-242.
37. G.B. Doern, "The political economy of regulating occupational health: The Ham and Beaudry reports," Canadian Public Administration (Summer 1977): 20.
38. Ibid. There have, however, been some recent indications of a willingness to commit such resources. Several unions have, for example, established occupational health clinics. See Peter Carlyle-George, "Workers go it alone for a health clinic," The Financial Post, Toronto, 10 October 1981.

39. Doern, op. cit. note 37, at pp. 5, 20.
40. Michael Levin, "The Limits of OSHA Reforms," Regulation (November/December 1979): 39. A recent New York Times/CBC poll revealed a similar level of support (69%) for maintaining present environmental protection legislation despite economic costs. (Forty-five percent favoured continuing improvements regardless of the costs.) The New York Times, 4 October 1981.
41. Wilfred List, "Regan contradicts himself on whether to streamline work-safety provisions," The Globe and Mail, Toronto, 20 June 1981.
42. Downs, op. cit. note 32.
43. Ibid., p. 40.
44. See Trebilcock, Hartle, Prichard, and Dewees, op. cit. note 9.
45. See especially Doern, Prince, and McNaughton, Living with Contradictions: Health and Safety Regulation and Implementation in Ontario, Study No. 5 prepared for the Royal Commission on Asbestos (Toronto: The Commission, 1982).
46. Doern, op. cit. note 37, at pp. 27-29.
47. See especially Morley Gunderson and Katherine Swinton, Collective Bargaining and Asbestos Dangers at the Workplace, Study No. 1 prepared for the Royal Commission on Asbestos (Toronto: The Commission, 1981).
48. G. Bruce Doern, Politics of Risk: The Identification of Toxic and Other Hazardous Substances in Canada, Study No. 4 prepared for the Royal Commission on Asbestos (Toronto: The Commission, 1982); Doern, Prince, and McNaughton, Living with Contradictions, op. cit. note 45; Sandra Glasbeek, "A Survey of Asbestos Policies in Canada with Particular Attention on Ontario," Background Paper No. 1 prepared for the Royal Commission on Asbestos (Toronto: 1981).
49. Roger Williams, Government Regulation of the Occupational and General Environments in the United Kingdom, the United States, and Sweden, Science Council Background Study No. 4 (Ottawa: Ministry of Supply and Services, 1971), p. 78.
50. Doern, op. cit. note 37, at pp. 8-9.
51. P. Nemetz et al. Regulation of Toxic Chemicals in the Environment, Regulation Reference, Working Paper No. 20 (Ottawa: Economic Council of Canada, 1980), p. 159.
52. Ibid., pp. 145ff.
53. In February 1981, an AFL-CIO spokesman announced the formation of a new coalition, of industrial union and environmental groups, the OSHA and Environmental Network," whose objective is to "prevent and eliminate health threats in the workplace and in the environment." See Asbestos Information Association/North America, Notes, 27 February 1981, p. 6.

54. R.J. Van Loon and M. Whittington, The Canadian Political System, 2nd ed. (Toronto: McGraw-Hill Ryerson, 1976), pp. 381-388; Eric Hehner, "Growth of Discretion, Decline of Accountability," in Public Administration in Canada, ed. Kenneth Kernaghan (Toronto: Methuen, 1977); G.B. Doern, "Introduction: The Regulatory Process in Canada," in The Regulatory Process in Canada, ed. G.B. Doern (Toronto: Macmillan, 1978); Robert Anderson, "The Federal Regulation-Making Process and Regulatory Reform, 1969-1979," in Government Regulation: Scope, Growth, and Process, ed. W.T. Stanbury (Montreal: Institute for Research on Public Policy, 1980).

CHAPTER 5 ETHICAL PERSPECTIVES ON HEALTH HAZARDS

An ethical framework for the evaluation of policy dealing with health hazards from asbestos might consist of responses to the following questions: Is there an indefeasible right to life and health such that the latter cannot be legitimately jeopardized save by the consent of the individual freely given? What are the procedural requirements of a morally legitimate decision on the balance between safety and compensated risk? What principles govern the just allocation of risks among the members of a society? A complete treatment of these questions is well beyond the scope of this study. Instead a brief and necessarily oversimplified account is presented of some perspectives on these issues offered by the tradition of moral and political philosophy.

I. The Right to Life

That the human being has a natural right to the preservation of his life is an assertion characteristic of many modern philosophers. The philosophers of Greek antiquity recognized no such absolute right, for to them the individual's dignity was first conferred by the political community, the authority of which was thus unconstrained by any pre-political rights supposedly inhering in the person. The ancients, we can say, knew natural duties but no natural rights. By contrast, the typical modern position is that the individual has a right to life prior to any association, a right that therefore cannot legitimately be curtailed except by his free consent. Thus Hobbes asserts that by nature each man has a liberty "to use his own power as he will himself for the

preservation of his own nature, that is, of his own life, and consequently of doing anything which . . . he shall conceive to be the aptest means thereunto."¹ And Locke claims that the preservation of man is "the fundamental law of nature," a law that limits the natural liberty each individual has to do as he pleases.²

Whence comes this right to life? Hobbes derives it from a metaphysical postulate concerning the character of natural bodies. All bodies are but configurations of matter in motion and are impelled by nature to preserve their motion. Since they cannot do otherwise than seek to preserve themselves, it seems they have a natural right to do so. Locke too derives a natural right from a natural fact. By nature all men are equal in the sense that there is no natural scheme of rule and subordination. Accordingly, "being all equal and independent, no one ought to harm another in his life, health, liberty, or possession."³ The classic critique of this deduction of rights from facts comes from Hume.⁴ To derive moral obligation from empirical statements about reality was, Hume argued, to take an unwarranted logical leap. Between "is" and "ought" there is an unbridgeable chasm, because there is nothing in the phenomena themselves that justifies any inferences about value. Normative judgements indicate nothing about objective reality; they reflect only the interests of human beings. The basis of rights and obligations is utility, and on this criterion all rights are contingent.

Any contemporary attempt to demonstrate a right to life must avoid the so-called naturalistic fallacy pointed out by Hume. At stake here is an issue central to the concern about occupational safety. Is the "right" to life to be subject to a utilitarian

calculus of social costs and benefits, or is it to constitute an external constraint on the pursuit of the general welfare, limitable if at all only with the individual's consent? A recent attempt to demonstrate an absolute right to life is Professor Alan Gewirth's Reason and Morality.⁵ Morality, argues Gewirth, is concerned with action. Action, while infinitely manifold, has certain generic structural features. It is purposive or directed towards ends that the agent regards as good. Since the individual values the objects of action he must also value the preconditions of purposive action itself, the conditions for the possibility of attaining any end whatever. These conditions are, in general, freedom and well-being, the latter including the goods of life and physical integrity. Now since these goods are the prerequisites of all purposive action, it follows (according to Gewirth) that the individual must lay claim to a right to these goods. He must do so for reasons of prudence, since freedom and well-being are the conditions of acquiring all the other things he desires. But once he has claimed a right to these goods he cannot without contradicting himself refuse to recognize an equal right inhering in all other purposive agents. Thus the right to well-being is derived from the demands of formal consistency upon one who of necessity claims such a right on prudential grounds. In deriving a right-claim from the formal structure of action, Gewirth admits to having deduced "ought" from "is," but claims to have overcome the objection against doing so. Such a derivation is here legitimate because the empirical structure of action already implicates an "ought." The agent

values the ends of action; hence he must value above all things the prerequisites of action. Since it would be inconsistent to value them and at the same time to acknowledge another's right arbitrarily to interfere with them, the individual must claim a right to these goods. The right-claim is thus logically necessitated by the positive valuation of action.

Gewirth's derivation of rights is prudential from first to last. I must respect another's right to life in order to avoid undermining my own claim to such a right. My claim is based on the instrumental value to me of freedom and well-being. The problem, however, with a prudential account of rights is that it fails to explain or justify the obligatoriness or binding character of moral rules. If morality is rooted in self-interest, then it is also at the mercy of self-interest. Gewirth answers this objection by arguing that the interest underlying moral obligation is an interest in the preconditions of attaining all other goods and, as such, is both universal and permanent, immune from the shifting calculations of expediency.⁶ This is indeed a powerful argument. However, even if the interest in freedom and well-being is paramount, it does not follow that moral obligation is the necessary means of satisfying it. If it were possible for someone to assure his freedom and well-being without acknowledging the rights of others, why should he not do so? Why should one with the capacity to become a tyrant choose instead the path of virtue? Gewirth's argument seems to hold good only for ordinary men for whom this choice is unavailable. Yet, as Plato taught, any satisfactory

account of moral obligation must justify it against the possibilities open to the strongest.

This suggests that a successful deduction of a right to life must abandon the ground of utility and return to the tradition of natural law.⁷ This tradition is in a sense prior to the dichotomy between "ought" and "is," because it rejects the notion (originated by modern natural science) that reality is empty of purpose, of normative goals. Following Hegel, one could say that man is, by virtue of his reason and will, potentially free, that freedom is his immanent essential nature. Freedom requires that one be master of one's life, free to shape and order it for self-chosen ends. No one has a right to put another's life in his power, to use it for his ends, for this would be to negate the autonomy that is essential to man and thus to deny the other's humanity. My obligation to respect the humanity in others is deducible from my obligation to become actually the autonomous person that I am potentially. For to the extent that I use others for egoistic ends, I am ruled by appetite and passion, by what is given to me independently of my will. To the extent, however, that I respect the independence of others, I am ruled by a law which, in that it guarantees the freedom of all, is but a dictate of my own reason.

II. Procedural Justice

It is unlikely that any ethical philosophy could single out a particular level of occupational safety as moral or just. Within limits defined by timorousness at one extreme and recklessness at the other, the decision as to the appropriate balance between

safety and risk seems properly to depend on the value orderings or "risk budgets" (in Charles Fried's terminology) of the individuals concerned. This is not to say that all orderings of ends are ethically equal. Few would hesitate to praise someone willing to risk his life for his freedom over one who, valuing life above all things, chooses to remain a slave. Our intuition in this regard suggests the existence of a natural priority of ends and hence too of a natural risk budget which correctly estimates what each end is worth relative to others in terms of risk of death. It is perhaps this notion that Plato expresses in his definition of courage as the knowledge in particular situations of what is and what is not to be feared. However, if such a natural valuation of ends exists, it seems clear that it must consist of ordinal rather than of cardinal measures. It is doubtful that a principle exists by which to link specific risk levels to specific goods.

However, if ethics cannot prescribe with precision the appropriate level of occupational safety, it can point out the procedural requirements of a legitimate decision concerning this level. These requirements are perhaps intuitively obvious. The decision must be based on the mutual consent of employer and employee, a consent given in circumstances from which all taint of coercion is removed. The matter, however, is not as simple as it first appears. What, we may ask, constitutes coercion? Alternatively put, what conditions must be satisfied in order that consent

may be regarded as free?⁸ No one would hesitate to call coercive a situation in which A induces B to sign a contract by a threat of physical violence. This example teaches that mere deliberate choice or voluntariness, while a necessary condition of free consent, is far from being a sufficient one. But the alternative criterion suggested by the example -- the absence of personal compulsion -- is not satisfactory either. Consider a situation in which A takes advantage of circumstances constraining B's choices in order to secure terms more favourable than he could otherwise obtain. Here one might distinguish between two forms of such advantage-taking: the case of the monopolist who is himself responsible for narrowing the choices available to B, and the case of one who merely exploits a situation of dire need found ready-to-hand. The first type belongs, perhaps, in a category with the example of the threat, since the constraints affecting the will of one party are deliberately imposed by the other. The second type, however, is qualitatively distinct from both, and yet B's consent is no less unfree for its having been forced by impersonal circumstances. If we wish to withhold moral approval from the second type of advantage-taking, then we are driven to the conclusion that the criterion distinguishing non-coercive from coercive agreements is equality. The latter is the only principle sufficiently comprehensive to explain the morally objectionable character of all three types of transaction, and yet sufficiently narrow to save the mutual advantage-taking implicit in bargains generally. On this principle, an agreement is alone morally legitimate if concluded in circumstances purified of all effects of the unequal strength of the parties.

Here, it might be thought, the conditions necessary for a legitimate outcome correspond to those required for an efficient one. Welfare maximization requires, after all, that the individual be capable of giving effect to his preferences. He must have available to him, therefore, a broad range of alternative employments; he must enjoy free movement into and out of these employments; and no one can be permitted to exercise market-wide control of the terms on which employment is offered. The condition of welfare maximization is, in short, freedom of choice, and the condition of freedom of choice is equality of economic power.

Nevertheless, the philosopher's test of a non-coerced choice is probably more stringent than that of an economist. The latter typically regards the classical model of the perfectly competitive market as the ideal standard of a non-coercive framework, as that economic system in which equality and freedom of choice are maximized. He thus takes as given the institution of contract as a means of distributing wealth, as well as the separation of labour and capital implicit in the employment contract. A critique of this model of non-coerced choice might, however, make the following points.⁹

In an advanced market economy there are severe constraints on the extent to which genuine equality is possible in a labour contract. Given the divorce in such an economy between labour and the means of production, and given also the high degree of specialization of skills and functions, a worker cannot sustain himself independently, but must

accept wage-employment on terms ultimately imposed by the employer. Furthermore, an exchange economy is characterized by freedom of accumulation and by a system of distribution based on market forces. Such an economy, in that it gives full scope to inequalities of natural endowment and of unearned social advantages, inevitably produces and perpetuates wide disparities of wealth, the cleavage between rich and poor corresponding to that between those who control and those who are excluded from control of the means of production. Neither of these inequalities is remediable by mere regulatory intervention. The first is rooted in the separation between labour and capital, the second in a system of contractual exchange. Both are thus endemic to a capitalist economy. Policies intended to equalize opportunity (e.g., free education, careers open to talent) leave intact the effects of unequal original endowment; policies that redistribute wealth cannot significantly reduce disparities without coming into conflict with the presuppositions of an exchange economy, the engine of which is self-interest and the desire for gain.

Such in brief outline is the Marxist critique of the labour contract as an institution allegedly based on consent and capable of generating legitimate decisions. Whatever we may think of the socialist alternative, this critique suggests several propositions relevant to our purpose. First, the conditions of a non-coerced choice on the level of occupational safety include factors that fail to obtain significance from the standpoint of efficiency. The fact that a worker's choice between safety and risk is constrained by the prospects of unemployment and indigence (or going on welfare) is not likely to bother the economist (qua economist), because it is with precisely such value conflicts and tradeoffs that

welfare maximization is concerned. Second, the conditions of a morally legitimate decision on occupational safety seem to be in tension with the structural features and foundations of a capitalist economy, in particular with the divorce between labour and capital and the market determination of distributive shares. And because of this tension, the conditions of legitimacy are not likely to be secured by interventionist policies which take these structural features for granted. This is not to suggest, however, that decisions on occupational safety would be any less coerced in a system of public ownership of the means of production. On the contrary, the anti-individualist implications of socialist thought suggest that in such a system consent would be dispensed with as a criterion of legitimacy, leaving the individual naked before the "general will." But public ownership is not the only answer to the separation and antagonism between labour and capital.

Another possible solution is industrial democracy, in which the institution of the labour contract is supplanted by co-operative modes of management and decision-making. Such a system would not, of course, eliminate either the dependence of the worker on the factory or extremes of poverty and wealth. It would therefore also leave unaffected a societal distribution of risks heavily determined by unearned natural and social advantages. Subject to these limitations, however, a regime of industrial democracy would, by substituting a co-operative for an adversary framework, confer legitimacy on health and safety decisions taken within the factory (leaving for further resolution the problem of how justly to distribute risks over the society as a whole). The

joint responsibility system now in place in Ontario in the occupational health area, involving joint worker-management committees to oversee issues of occupational health and safety on the work site, exhibits many of these properties.

§II. Distributive Justice

If ethics is silent about the appropriate balance in any industry between safety and risk, it has very definite things to say about the distribution of risks among individuals and groups in society. For this is a question of distributive justice, of the just allocation of the benefits and burdens of political association. While there are virtually as many positions on this question as there are moral philosophers, at least one generalization may be made. No ethical philosophy worthy of the name would accept a distribution that is purely the outcome of chance and the lawless exercise of power. Rather, an ethical approach to this question must insist that distribution be in accordance with, or at any rate constrained by, rational principle.

Here we might distinguish between two broad types of theories of distributive justice. One type identifies the principle governing the just allocation of goods with the principles governing the legitimate acquisition and transfer of goods. A distribution is just if it accords with the laws of property. Here the maximum latitude consistent with civil society is accorded the vicissitudes of chance and power. The distribution, though constrained by rules, will nevertheless be random. The accidents of birth and of natural endowment will be allowed to be decisive. A contemporary example of such an approach is Robert Nozick's Anarchy, State, and Utopia.¹⁰ Applied to the problem of the distribution of risks, Nozick's principle yields the conclusion that whatever allocation is made by the market

satisfies the requirements of justice. For if we may assume that the lion's share of occupational risk will fall to the poor, and if property is justly distributed by the process of free transfer in the market, then so too are risks. There is thus neither need nor justification for government intervention to correct or modify the distribution spontaneously arrived at.

The second type of approach is one that patterns the distribution of benefits and burdens according to an autonomous principle of distributive justice. We shall discuss the effect of three such principles: the Aristotelian; the utilitarian; and the Kantian.

A. Aristotle

In the Nicomachean Ethics, Aristotle tells us that distributive justice is that form of justice which corresponds to the popular notion of fairness.¹¹ It consists in giving to each man that share of desirable things that he deserves. While few would disagree that desert should be the principle of distribution, the criterion of desert is controversial. The one that is adopted will reflect a particular view of human nature and of the goal of political association.¹² If mere self-preservation is the natural end of human activity, then there is no basis in nature for the distinction between the noble and the base. All men are equal and hence deserve equal shares. If, on the other hand, the proper end of life is acquisition and of political association the protection of unequal shares, then we have an oligarchic regime in which benefits and burdens are distributed proportionately to wealth. Aristotle rejects both these views of distributive justice because

he rejects the conception of the human good on which they are based. For Aristotle, the natural end of man is moral excellence and the proper end of politics is the cultivation of such excellence. Moral excellence consists (in general) in the subordination of the appetitive to the rational part of the soul. Since this subordination is natural, it follows that a natural basis exists for the distinction between the noble and the base. Some men are better than others and deserve more than others. Those capable, by virtue of superior "equipment" of perfecting their human nature will receive more of the benefits and fewer of the burdens of political association than those less fortunately endowed. The chief benefit of political association is leisure, that is, freedom to devote oneself to education and ruling. The chief burden is the physical labour necessary to support the cultivation of virtue. The benefits will be the exclusive preserve of one class, the burdens of another.¹³ Though radically unequal, this allocation nonetheless serves the common good, because on the assumption of natural aristocracy, the true good or end of those who cannot attain excellence is achieved by serving and being ruled by those who can.

The consequences of the Aristotelian view for the distribution of occupational risks are plain. There is nothing intrinsically unjust about an unequal allocation of risks as between mental and physical labour nor in the few deriving gratuitous benefits by imposing unilateral risks on the many. On the other hand, this

proposition is true only where privilege is based on the natural superiority in moral capacity of some men over others. Aristotle makes it clear that, where all men are peers, that is, equally capable of virtue, then the only just principle of distribution is equality.¹⁴ And where none are so capable, then benefits and burdens must, he argues be distributed with a view simply to maintaining political stability. Allocation should here be based on a mixture of democratic and oligarchic principles in order to secure the allegiance to the regime of both the wealthy and the poor.¹⁵

B. Utilitarianism

Utilitarian thought rejects the classical theory of natural law according to which the distinction between justice and injustice is rooted in men's nature and is thus independent of opinion and interest. For Bentham human nature is essentially appetitive. All human beings seek pleasure and avoid pain. They call good what increases their pleasure and evil what augments their suffering. The social measure of just and unjust is thus utility.¹⁶ That distribution of benefits and burdens is alone just that maximizes welfare in the social aggregate. This criterion of distributive justice is at once egalitarian and collectivist. It is egalitarian in the sense that no individual's preferences count for more in the social calculus than that of any other; it is collectivist in the sense that the suffering of some is justified if it leads to overbalancing pleasure for others.

Historically (though arguably not essentially) the utilitarian principle of distributive justice is connected with economic liberalism. The nineteenth century utilitarians believed that a perfectly functioning market would spontaneously maximize welfare. This view was based partly on a narrowly economic conception of welfare as consisting in the satisfaction of material wants, and partly on a conception of man as a rational egoist. All individuals, the utilitarians thought, seek to maximize their satisfactions. They are thus impelled to make exchanges, the result of which is the transfer of goods from less to more valued uses. Each individual will exchange up to a point where the marginal utility of a unit of the good he buys equals the marginal utility of a unit of the good he sells. Beyond this point, any further exchange will leave him worse off than before. Accordingly, exchanges will take place in society until no one can be made better off without someone being made worse off, at which point wealth is optimally distributed.

Applying this framework to the problem of risk-allocation might produce the following result. Assuming perfect mobility and knowledge, workers will bargain with employers until the point is reached where the inequality of risk among the various occupations is compensated for to the extent that workers are indifferent as between the higher and lower risk jobs. Let us call this position one. If the level of compensation required to produce this result leads to investment insufficient for full employment, labour demand will bid wages down to a level below that required for full compensation for risk-differentials. Moreover, this

pressure will continue until a level of uncompensated risk is reached at which the worker is indifferent as between work and unemployment. Call this position two. At this point of equilibrium, the risk-burden associated with the achieved level of output is unequally distributed. More specifically, the difference between the output at position one and the output at position two has been purchased by the assumption of uncompensated risk by some for the benefit of all. On utilitarian principles, however, this result is just and need not be interfered with. This is because the cost to the workers of uncompensated risk is outweighed by the combined benefits of employment to those same workers and the output generated by that employment.

C. Kant

The cornerstone of Kant's moral thought is the insight that man is essentially autonomous, free from subjection to any but rational and self-imposed rules; that all men are equal in respect of this capacity, hence equal in dignity; and that equality of freedom is a categorical imperative, a moral "ought" that is objectively authoritative for conduct and laws. For Kant, autonomy is the common good of man, and governments are legitimate only to the extent that they respect this good.¹⁷

A Kantian perspective has far-reaching consequences for public policy on occupational safety. The moral imperative of human autonomy underlies the modern scientific project to "master" nature, to subdue it to man's rational control, hence to reduce

as far as possible the risk of disease and accident. It also justifies massive state action to indemnify human beings against such risks, subject to the constraint of allowing individuals the maximum scope for freedom of action compatible with the welfare of others. Moreover, a Kantian perspective implies an ambivalence towards the market as an institution capable of realizing the freedom of the will. On the one hand, it is the sphere of private transactions in which human beings give effect to self-determined choices and projects and gain confirmation of their worth as differentiated individuals; on the other, it is a blind concatenation of forces emancipated from rational control and determining the individual as an external and alien necessity. Accordingly, while the market must be respected, it must also be regulated. Regulation on Kantian principles will, however, differ markedly from regulation inspired by utilitarianism. Whereas the latter will strive merely to replicate the outcomes of a perfectly functioning market, Kantian intervention will aim at goals that transcend and oppose the market. For the principle of autonomy implies a radical rejection of the market as an institution capable by itself of producing a just distribution of benefits and burdens. Even if the market were perfectly functioning, its outcomes would still be decisively influenced by the accidents of endowment and birth and by the effect of these factors on the relative bargaining power of contracting parties. Where the principle of human autonomy has not yet been intellectually

grasped as the authoritative standard of right, the fact that such accidents have social and political relevance is morally insignificant and hence no cause for intervention. Where, however, that principle has become morally binding, the influence of such factors acquires the significance of a negation of right and thus can no longer be tolerated.

To what principles of distributive justice does a Kantian position lead? A comprehensive working out of this problem is John Rawls' A Theory of Justice.¹⁸ Given that human beings are free and equal, that distributive principle is alone legitimate that would necessarily be assented to by rational individuals acting disinterestedly. The principle must therefore be deduced from a social contract concluded under a "veil of ignorance" hiding each individual's special advantages and prospects and thus guaranteeing impartiality. The distributive principle to which such an agreement would lead is equality. Any departure from this principle in the distribution of social and economic goods (though not of political rights) is justified only to the extent that the position of the least advantaged is improved thereby. Inequality is legitimate only if there are compensating benefits not to society in general but to the class of individuals at the bottom of the scale.¹⁹

Applied to the problem of distributing the risk burdens associated with given social goals, this principle might yield the following maxim: no one ought to be subjected to a level of risk higher than that to which any other group is exposed unless the difference in risk is compensated for so that the

individual is indifferent as between the higher and lower risk job. Such a rule would produce, if not an equality of risk, then an equality of satisfaction. As we saw earlier, however, this rule might (and probably would) require a level of compensation and/or expenditures on safety incompatible with investment sufficient to keep unemployment at acceptable levels. Accordingly, the rule enjoining an equality of satisfaction can at most delineate a long-term social objective. A principle practicable in the short-run might be: no one ought gratuitously to benefit from the assumption of uncompensated risk by others. Professor Charles Fried has derived such a principle ("the hazard of no individual is [to be] used to increase the benefit to others")²⁰ from the application of a Kantian-Rawlsian social contract theory to the problem of the distribution of risks. Briefly, his argument runs as follows:

The exercise of one's freedom (and hence the fulfillment of one's human capacities) necessitates not only accepting risks for oneself but imposing them on others as well. I am justified in imposing risks on others for the sake of my freedom only to the extent that I grant others an equal right to impose on me for the sake of theirs. The level of mutually acceptable risk is determined by an intersubjective risk budget which estimates what various ends are worth in terms of risk of death and which is simply the rational budget for an individual person writ large. This level forms a

"risk pool" upon which the individual may draw from time to time to secure appropriate benefits for himself. However, the symmetry between personal and interpersonal risk budgets breaks down in the case of grave risks of death. For it is one thing to risk my own life for a personal end objectively worthy of such a risk; it is quite another to risk someone else's life for such an end. While a rational person would consent to the imposition for another's benefit of levels of risk that are ordinarily incident on the exercise of freedom (on condition that he may do likewise), he would never consent to the imposition of extraordinary risks unless there were compensating and worthwhile benefits accruing to him. Thus, to borrow an example of Fried's, the driver of a fire engine is justified in imposing extraordinary and unilateral risks on the Sunday driver only because the latter may one day require the same service. This is simply an application of the Kantian principle that limitations on liberty are legitimate only where the rational person would impose them on himself.

Fried's theory is primarily an account of the law of negligence and, as such, is not entirely free from difficulties. In particular, it fails to provide a criterion for distinguishing between reasonable and excessive risk. The concept of the risk budget introduced for this purpose is ultimately said to be applicable only to "ordinary and background" levels of risk, suggesting that there is a notion of extraordinary risk determined independently of the budget. Nevertheless, Fried's principles are relevant to the problem of distributing

risks fairly and have policy implications for occupational health and safety. Specifically, they would require that the benefits accruing to the rest of society from the assumption by others of uncompensated risk be taxed away and redistributed-- used either for compensating victims for the costs of accidents (as under our workers' compensation system) or for subsidizing investment in increased safety, or both.

IV. Conclusion

What conclusions can we draw from so many divergent and controversial standpoints? Although few philosophers (Hobbes is the exception) would regard life and health as the supreme goods, most would agree that they hold a paramount place among the instrumental goods (i.e., among the goods desirable for the sake of something else), for they are the conditions of attaining all other worthwhile things. If, moreover, human beings are equal in dignity, it follows that they have an equal right to the preservation of their lives and health. Unless we are prepared to say that some men are genetically barred from becoming fully human, then we must acknowledge the lack of any rational basis for an unequal allocation of the risk-burdens associated with social objectives. And to permit this allocation to be determined by irrational factors is inconsistent with the egalitarian and rationalist foundation of modern thought. If these propositions are true, then the present system of allocating risks by means of the labour contract

is unjust. It is unjust to the extent that such contracts are concluded in circumstances constraining freedom of choice, circumstances which render the equalization of risks or the full compensation for risk-differentials impossible. The dependence of the worker on the factory, his relative poverty, the narrowness of his occupational choices are factors which militate against the equalization of risk-burdens through a private process of bargaining. What seems to be demanded, therefore, is public action at once emancipated from the self-interest of private groups and purified of the effects of their unequal strength, action rationally and systematically grounded on the principle of equality. Such public action, moreover, must be carefully cast so as to avoid counterproductive effects. Prohibitions or standards, standing alone, which render an industry no longer economically viable (at least at its previous scale) may lead to some employees having no jobs at all rather than merely high-risk jobs. Subsidy policies may have to be contemplated to foreclose these effects.

The ethical framework presented here applies, mutatis mutandis, not only to risks knowingly incurred in contractual relationships but also to those imposed on an unwitting public. The exposure of persons to health hazards from asbestos present in government buildings, schools, and consumer products presents, perhaps, an even stronger case for public intervention, since in these contexts there is often lacking even the formal consent minimally required to legitimize the imposition of risk. Fried's theory of negligence is especially relevant to such situations. The question becomes whether such hazards are within levels acceptable to individuals as the price for the right to impose equal risks on others or whether they represent an excessive imposition of burdens on some for the exclusive benefit of others. It would seem that this question can be answered only through public consultative processes involving all interested groups. Different pro-

cesses might appropriately be involved for occupational and environmental health risks, given the different interests affected. Such processes would be designed both to elicit some consensus on possible risk levels associated with alternative courses of action and to arrive at decisions on ethically acceptable levels of risk.

Recognizing the inability of any theory of distributive justice to prescribe, in a substantive way, socially just levels of safety and risk, we are compelled here to settle on procedural notions of justice. The contours of an ethically acceptable procedure for prescribing and allocating health risks probably involve an implicit (politically mediated) bargaining process amongst all affected interests. In order to avoid the counterproductive effects of intervention noted above, the process chosen should be invested with sufficient authority to deploy subsidy policies to underwrite the costs of acceptable levels of safety where the economic viability of an industry is a constraint or to promote worker retraining, relocation, or retirement decisions where acceptable safety standards are technologically infeasible. The taxpayers underwriting such policies clearly comprises one of the constituencies to be represented in this bargaining process.

Notes to Chapter 5

1. Thomas Hobbes, Leviathan (Oxford: Blackwell, 1957), p. 84.
2. John Locke, Two Treatises of Government, ed. Peter Laslett (Surrey: Mentor, 1965), p. 319.
3. Ibid., p. 311.
4. David Hume, A Treatise of Human Nature (Oxford: Clarendon Press, 1888), pp. 468-469.
5. Alan Gewirth, Reason and Morality (Chicago: University of Chicago Press, 1978).
6. Ibid., pp. 164-165.
7. See John Finnis, Natural Law and Natural Rights (Oxford: Clarendon Press, 1980).
8. Anthony T. Kronman, "Contract Law and Distributive Justice," Yale Law Journal 89 (January 1980): 472-511; Charles Fried, Contract as Promise (Cambridge: Harvard University Press, 1981), pp. 92-111; David Zimmerman, "Coercive Wage Offers," Philosophy and Public Affairs 10 (Spring 1981): 121-145.
9. See C.B. Macpherson, "Elegant Tombstones: A Note on Friedman's Freedom," in Democratic Theory (Oxford: Oxford University Press, 1973); David M. Beatty, "Labour Is Not a Commodity," in Studies in Contract Law, eds. Barry J. Reiter and John Swan (Toronto: Butterworths, 1980), pp. 314-355.
10. Robert Nozick, Anarchy, State, and Utopia (New York: Basic Books, 1974), pp. 149-164.
11. Aristotle, Nicomachean Ethics 1129a, 1130b.
12. Aristotle, Politics, 1280a-1281a.
13. Ibid., 1328a-1329a.
14. Ibid., 1287a-1288a.
15. Ibid., 1294b.
16. Jeremy Bentham, The Principles of Morals and Legislation (New York: Hafner, 1970), pp. 1-2.
17. Immanuel Kant, The Metaphysical Elements of Justice, trans. John Ladd (Indianapolis: Liberal Arts Press, 1965).
18. John Rawls, A Theory of Justice (Cambridge: Harvard University Press, 1971).
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PART TWO: THE POLICY INSTRUMENTS

CHAPTER 6 IMPROVING BARGAINING PROCESSES

I. Introduction: Explicit and Implicit Bargaining Processes

Our earlier description of the economic framework for evaluating regulatory policies on occupational health hazards described how, in theory, the safety/risk levels arrived at by a process of voluntary, informed bargaining in a perfectly competitive marketplace represent a Pareto-optimum. Reasons why markets often do not satisfy the conditions underlying this model were noted. In particular, in our context, information and transaction costs are major forms of imperfections, with monopsony in labour markets a less frequent form of imperfection. In our other frameworks, we also noted how private market interactions may fail to satisfy the need to resolve scientific uncertainties and controversies, ethical imperatives that accord a special value to the right to safety, and political imperatives that seek to promote policies that attract optimal levels of political support, given the incentives facing actors within our existing political system.

In determining what weight is to be attached to these factors and in deciding what policy responses to them might be appropriate, it is important to recognize that bargaining elements, explicit or implicit, are present in all of the policy options reviewed in this study. While explicit bargaining relationships are likely to remain a central feature of labour and product markets (upon which processes regulatory policies regarding health hazards must necessarily be grafted), one can argue that most forms of collective intervention involve, to some extent, a measure of bargaining among affected interests. For example, civil

liability regimes involve adversarial relationships between affected parties. Litigation typically represents the breakdown of voluntary efforts to secure mutually satisfactory resolutions of competing claims of right. In this sense, litigants commonly engage in bargaining processes with a view to securing a settlement of their differences, albeit bargaining processes that take place in the "shadow" of the prospect of judicial adjudication in the event that these processes break down,

In the case of tax and subsidy policies and public standard-setting, the bureaucratic/regulatory/political decision-making processes involved will typically involve interactions among affected interests, albeit in the presence of decision-makers charged with the responsibility of mediating or adjudicating upon the merits of the competing interests. In much of the recent economic and political science literature on collective decision-making (some of it cited in our discussion of political decision-making in Chapter 4), public policies have been viewed as the outcome of a form of implicit bargaining among affected interests, with voters or interest groups conceived of as demanders of favourable policy outcomes and politicians, or their delegates, as suppliers of policies.¹ On this view, policies will be supplied to those interests whose effective demand is highest, that is, the most politically salient interests, given an assumption of political support maximization (or the creation of minimum winning coalitions) on the part of politicians. In pursuing this objective, it is assumed that politicians will often find it politically rational to attempt to negotiate compromises among affected interests so that extreme forms of alienation of key political

interests are avoided. In the search for the political margins of manoeuvre, a form of mediated bargaining is set in motion. In its more extreme form, this may involve interest groups, through political intermediation, trading policies over functionally unrelated issues so that differences in the intensity of preferences on different issues are appropriately reflected in a larger spectrum of policies (often referred to as log-rolling).

If one accepts that this view captures a large part of the political realities of collective decision-making, then one can view all of the policy options open to decision-makers with respect to health hazards as involving bargaining processes as an important ingredient. The question then becomes, how are bargaining outcomes likely to be shaped or modified by the different institutional settings and constraints entailed in each of the various classes of policy options reviewed?

In evaluating how explicit bargaining processes, for example, in labour and product markets, fail or might be improved, it becomes important to keep in mind that the two major sources of imperfections (i.e., information and transaction costs) that have been identified in our economic framework also have to be confronted in evaluating alternative, implicit, "bargaining" processes. In what ways does substituting one instrument for another ameliorate or exacerbate these problems of information and transaction costs? Also, in what ways does substituting one bargaining instrument for another ameliorate or exacerbate the limitations of private market interactions suggested

by our scientific, ethical and political frameworks?

II. Explicit Bargaining Processes

In terms of degrees of intervention in previously unregulated market processes, the least interventionist policy that might be considered would be the provision of additional information to individual, private economic agents so as to improve their appreciation of the costs and benefits of alternative courses of action that may be open to them. In a world of scientific certainty, one might require firms that produce hazardous products, hire employees to work in hazardous workplaces or engage in environmentally hazardous production processes, to warn those subjected to the health risks involved of the nature of these risks. Several examples of such requirements in this context already exist.

For example, s.9 of the Ontario Occupation Health and Safety Act² provides that for workplaces to which The Workmen's Compensation Act applies:

... the Workmen's Compensation Board, upon the request of an employer, a worker, committee, health and safety representative or trade union, shall send to the employer, and to the worker, committee, health and safety representative or trade union requesting the information an annual summary of data relating to the employer in respect of the number of work accident fatalities, the number of lost workday cases, the number of lost workdays, the number of non-fatal cases that required medical aid without lost workdays, the incidents of occupational illnesses, the number of occupational injuries, and such other data as the Board may consider necessary or advisable.

Similarly, s. 14(2)(c) of the same Act provides that an employer shall 'acquaint a worker or a person in authority over a worker with any hazard in the workplace and in the handling, storage, use, and disposal and transport of any article, device, equipment or a biological, chemical or physical agent."

Section 20(1) of the Act provides that where a biological, chemical, or physical agent is intended to be used in the workplace and its use is in the opinion of the Director under the Act likely to endanger the health of a worker, the Director may prohibit its use or restrict the manner of its use. Copies of such order must be posted in a conspicuous place in the workplace where they are most likely to come to the attention of affected workers.

Sections 25 to 27 of the Act require notice to be given by an employer to enforcement officials, joint health and safety committees, health and safety representatives, and trade unions of fatalities or critical injuries suffered from any cause at a workplace; similar notice requirements apply to accidents, explosions, or fires causing injury, and to occupational illnesses. Orders or inspection reports issued by inspectors must also be posted in a conspicuous place in a workplace.³

Under regulations relating to asbestos proposed by the Ontario Ministry of Labour pursuant to The Occupational Health and Safety Act, employers are required to maintain personal exposure records

of a worker to asbestos and to undertake medical examinations and tests of a worker including pre-placement and periodic medical examinations, x-rays and tests. This material is to be made available to workers. The results of air monitoring in a workplace under the asbestos control programme must also be posted in a conspicuous place at the workplace.⁴

In relation to product hazards, the U.S. Consumer Product Safety Act⁵ requires a manufacturer who is aware of substantial health risks associated with his product to notify the Consumer Product Safety Commission, which is the agency that administers the Act.⁶ This information is publicly available. There is no similar self-reporting requirement in the analogous Canadian legislation (the Hazardous Products Act).⁷

Several points might be made about these types of information requirements: First, they tend to assume a high degree of certainty about cause and effect relationships and in this respect capture only a small fraction of all potential health hazards in any given context. With respect to potential health hazards where there is substantial scientific uncertainty or controversy, it would seem unrealistic to expect employers to generate new basic scientific research on potential hazards. This research would need to relate to: whether a particular substance can pose health hazards, whether the hazards are actually present in a given plant and at what level, and what the costs of alternative abatement strategies might be. Requiring individual firms to engage in research on all these questions is likely to

prove an impossible requirement to monitor effectively. Moreover, it would seem inefficient to require all firms in an industry to engage in such research. The public goods nature of much of this information suggests a need for direct public provision or sponsorship.

Second, even where a high degree of certainty exists about critical relationships, often it will still tend to be probabilistic in nature, especially with respect to illnesses as opposed to accidents. This leaves parties who are exposed to the hazards with formidable information processing tasks in evaluating the expected cost to them of assuming the risks and relating this information to what is likely also to be probabilistic information about substitute jobs, products, locational settings etc. As we have seen, cognitive biases may distort the processing of relative risks.

Third, there are serious questions about how effectively many of these self-reporting requirements can be enforced. As Christopher Stone argues in his recent book, Where the Law Ends: The Social Control of Corporate Behaviour,⁸ legal sanctions that focus on the firm as an entity often are so diffused and attenuated in their impact that they may effect little or no change in the internal decision-making processes of large corporations. Incentive structures within such corporations may inhibit information flows up the corporate hierarchy from employees or officers with first-hand acquaintance with health hazards to the board of directors; in turn, the board of directors may also face incentives that discourage apprising

themselves personally of "bad news" about existing products, production processes, etc. Stone argues for an ambitious and detailed series of proposals for restructuring internal corporate decision-making processes so as to designate agents within a corporation as having special legal responsibilities for generating information about activities with negative social impacts and feeding this information to a restructured board of directors comprising some directors with special legal responsibilities for searching out and acting on this information. Without attempting to evaluate the merits of Stone's proposals one can probably acknowledge some truth to his premise that external enforcement of an obligation to report "bad news" antithetical to a corporation's financial interests is likely to be highly imperfect.

Fourth, even if one assumes that all parties who are exposed to health hazards become fully cognizant of the risks entailed, difficult questions will often arise as to their ability to react effectively to this information. To take the most extreme case first, with respect to environmental health hazards all the information in the world provided to residents in a neighbourhood to the effect that a firm in that neighbourhood is contaminating the air with hazardous pollutants (e.g., asbestos fibres) may have little or no impact on the ability of the residents to bargain with the firm to abate the pollution, even assuming that the residents value the benefits of abatement in excess of the costs thereof, so that in theory there is room for a mutually advantageous bargain. In this case, transaction

costs (rather than information costs) in the form of free-rider and hold-out problems that inhibit collective action by the residents as a group are likely to prevent any effective bargaining process from taking place. Importantly, of course, these organizational disabilities, unless independently responded to, pose problems of ensuring effective participation of this interest group in any other institutional setting that might be designed to deal with this hazard.

In the absence of effective, explicit bargaining by the group of residents with the polluting firm, individual residents face severely constrained choices: either to suffer the pollution or to incur private costs in relocating. Apart from the equities of the situation, either choice is inefficient because, by hypothesis, another solution with a lower social cost has not been realized, that is, abatement.

A somewhat similar problem may arise in many occupational health contexts. Workers employed in monopsonized labour markets (e.g., one-company industries or one-industry regions), or workers who have been exposed to health hazards for long periods of time and are therefore high-risk and unattractive prospects for other employers, may have very limited ability to react effectively to new information about health hazards to which they have been exposed, either in terms of negotiating an additional risk premium or additional safety precautions (with no wage offset) or relocating.

If collective bargaining is introduced into the equation, some of the costs facing individual workers in evaluating and responding to new information about job risks may be mitigated. Other costs remain and some new costs are introduced.⁹ First, the presence of a union may enable the realization of economies of scale in evaluating and interpreting new information. Instead of each individual worker being required to perform this exercise, union representatives can perform the task as agents for all members. Second, a union is in a better position to threaten the imposition of greater costs on an employer, in the absence of a satisfactory response to new information on health hazards, than individual workers. However, both propositions are not without substantial qualifications.

In relation to the information-processing role of a union as agent for its members, persuading workers to take a higher percentage of their employment benefits in improved safety conditions and a lower percentage in explicit wages (as would often seem likely to be the case) involves the union leadership communicating information on safety risks effectively to individual members in order for the latter to be persuaded that the benefit package is the best available and to support it accordingly. Again, this leaves individual employees bearing significant information costs and raises questions about the comparative effectiveness of union representatives as community educators. Moreover, because the costs to both union representatives

and union members in conveying and comprehending information about health risks and potential safety precautions (and costs thereof) are likely to be higher than the costs entailed in conveying and comprehending information about explicit wage benefits, there is likely to be a significant bias in favour of the value attached to explicit wage benefits and against safety benefits. Union representatives are elected by the union membership and ultimately, if they wish to retain the political support of their membership, they are compelled to negotiate benefit packages that reflect individual members' perceptions of the relative value of the different items in the package, however ill-informed these perceptions may be.

A different form of distortion may also be introduced into the collective bargaining process to the extent that long-term benefits from safety improvements are excessively discounted relative to short-term wage improvements. With twenty- or thirty-year lags involved between exposure and illness in the case of toxic substances, such as asbestos, union leaderships face the problem of maximizing returns to present members rather than future employees who may stand to gain most from safety improvements. Present employees, who may already have been subjected to lengthy periods of exposure, may see the return to themselves from safety improvements as marginal -- they have already absorbed the risk. The principal beneficiaries of enhanced safety standards may be future employees to whom the present union leadership is not accountable.

A further distortion that collective bargaining may introduce into the process of arriving at the safety/risk levels postulated by the perfectly functioning market model is what recent economic literature calls agency costs.¹⁰ While unions may be able to realize economies of scale in processing information about health risks, they introduce a new cost for individual members in terms of the probability of individual risk preferences being respected. A more or less uniform set of safety benefits is likely to be negotiated and endorsed by majority decision of the membership, but individual members who would have preferred more or less safety (and adjustments to other conditions of employment) will have their preferences disregarded. The assumption of homogeneous risk preferences among workers is often likely to prove false -- for example, older workers who have already faced long exposure to risks may derive fewer benefits from enhanced levels of safety and accordingly value them less than younger workers. If union representatives are drawn from the ranks of older workers, this may lead to reduced sensitivity to the health risks faced by younger workers.

Finally, it should be noted that the presence of collective bargaining is unlikely to be able to generate new scientific research on key relationships that are presently uncertain or controversial. As with firms, unions who invest resources in undertaking or supporting this kind of fundamental research would face a major public goods problem in attempting to capture the full social benefits of the research for their members. Even if public subsidies were forthcoming, it is not clear that either firms or unions have any comparative

advantage over other institutions in undertaking this kind of research.

With respect to the question of whether unions are able to exert more pressure on employers on safety issues than individual members (by being able to threaten to impose greater costs), it might be argued that this proposition, too, can be overstated. If before the advent of new information about health risks, a union was exerting its economic power in relation to the employer to the full, then demanding improved safety standards under threat of collective withdrawal of services can, at best, simply change the mix of elements in the benefit package. It seems unlikely that a union, any more than individual employees, will be able to insist on safety improvements as add-ons that involve no offsetting reduction in other employment benefits. In other words, the union can use its economic power to exact improvements in either wage or safety benefits. If it chooses to insist on the latter, this is presumably at some cost in terms of the former. To insist on both would presumably be at some point to violate industry viability (and hence levels of employment in the industry). Only subsidy instruments underwritten by sources outside the industry are likely to remove this form of constraint.

If we consider more substantial public interventions into private decision-making than have hitherto been canvassed, one might contemplate, as the next gradation along a continuum of intervention,

the public generation and dissemination of basic scientific research in areas of substantial scientific uncertainty or controversy. This might entail such options as government itself undertaking such research or providing resources to research institutions outside government for this purpose or the creation of specialized institutions, such as Science Courts, to adjudicate on issues of scientific controversy. In each case, new information so generated would simply be made available to private economic actors to adjust their private decision-making as they see fit in the light of this information. Such an approach would be responsive to the public goods character of basic research. How effective would such an approach be likely to be?

First of all, with respect to externality effects from environmentally created health hazards, for reasons already canvassed parties at risk would still be likely to face formidable transaction costs in responding effectively to this information and in this respect would derive few advantages from such a policy.

Second, in the case of individual employees or consumers who might wish to adjust their contractual relationships in the light of this information, these individuals would still face substantial information costs in processing this information and relating it to their particular employment or consumption choices. Problems of bounded rationality would continue to be significant sources of imperfections in private decision-making.

Third, in cases where collective bargaining exists, problems of information processing and bounded rationality may be mitigated somewhat by the economies of scale able to be realized through collective action, but they are unlikely to be eliminated completely. Moreover, the agency costs involved in collective bargaining as an institution are likely to be little affected.

Finally, in the collective bargaining context, even assuming full knowledge now of potential health risks, the economic constraints within which bargaining must take place, in particular the economic viability of the firms in question and levels of employment in the industry, remain unaffected.

III. Implicit Bargaining Processes

If, for these reasons, a more substantial form of intervention were to be contemplated, essentially, some form of public standard-setting would seem to be entailed, whether in the form of taxes, subsidies, or direct standards, as reviewed later in this study. Implicit bargaining amongst affected constituencies will be involved both in determining the instrument of intervention and in its administration thereafter. The exact nature of the bargaining processes set in train by the choice of instrument will vary with the instrument. The administration of a tax instrument, once chosen, may involve a relatively closed process. Heavy reliance on civil liability regimes, especially with liberal class action rules engrafted

thereon, is likely to provoke more confrontational bargaining interactions. A standard-setting regime may be more accomodative and consensus-oriented.

With most instruments of intervention, an agency of government would undertake the task not only of generating relevant information on health risks but also of interpreting and applying that information to the various settings in which the risks were present. Such an agency can be conceived of as a kind of comprehensive agent acting on behalf of all affected interests and ultimately making all decisions on their behalf.¹¹ While this would achieve various economies of scale in information generation and processing, new forms of agency costs would be generated. First, because the agency would be required to weigh the interests of various, often competing, constituencies, a simple agency model would not fully capture the role of the standard-setting agency. Crucially, while the agency may be able to realize economies of scale with respect to certain kinds of information costs, information about the preferences of individuals with respect to risk and the bearing of costs with respect to the reduction of risks would still have to be collected. Presumably, this is likely to entail designing some form of participation in the standard-setting process for affected interests so that their preferences can be registered. At this point, the characterization of whatever regulatory process might be involved as a form of implicit, mediated, bargaining process becomes relevant.

Designing a process that facilitates an optimal form of bargaining among affected interests might be viewed as the principal goal of the task of institutional design.¹² This may be particularly so in cases of what Lon Fuller calls "polycentric" issues involving multiple options, multiple parties, and wide-ranging second and third order effects, making formal, judicialized adjudication against clear a priori standards an unworkable institutional vehicle for policy determinations.¹³ In these cases some intractable problems have to be addressed. The concept of optimality in this context is far from precise.

First, however, it might be argued that participation cannot be meaningful unless the participants are fully apprised of the risks in question. Thus, again, individual members of affected interests, or their representatives, face some information costs in developing this appreciation of the risks in question. Whether these information costs are likely to be lower than under the various bargaining scenarios already addressed may be a matter of conjecture.

Second, the goal of meaningful participation would need to resolve the problem of transactions costs that prevents effective participation by certain kinds of widely diffused interests (e.g., environmentally affected interests) in private interactions. Probably, some form of public funding of such interests, or representatives of them, is required if these organizational disabilities are to be overcome.¹⁴ However, funding policies in turn have to contend with new forms of agency costs. Simply funding self-proclaimed representatives

of certain interests does not ensure accountability of those representatives to their constituencies. Any accountability regime will face information and transaction cost problems in ensuring that individual members of widely diffused constituencies are able to hold their representatives accountable for the preferences articulated on behalf of the constituents. Moreover, the regulatory institution itself will face information costs in persuading members of the various affected constituencies to accept the legitimacy of the regulatory outcome and its role in it. Information flows in collective decision-making are more likely to be marked by appeals to ideology and symbolism than information flows in private market interactions, particularly in the case of members of thinly-spread constituencies whose individual stakes in an issue do not justify substantial investments in information. The enhanced role of ideology and symbolism in collective decision-making creates one possible source of divergence in outcomes from those yielded by private market interactions.¹⁵

Third, there is the difficult question of what these various affected interests are "bargaining" with in the regulatory process. For example, if firms are creating environmental health hazards, what do those interests who are exposed to the hazards bargain with in interactions with the firms in the regulatory process?

In the case of private interactions, parties bargain with each other in terms of economic resources which each has to offer to the other, and relative endowments are a crucial constraint on what bargains are attainable. In the implicit bargaining process postulated in the case of

a regulatory process, it is not clear that similar constraints are relevant.

Ultimately, it would seem to be the case that while relative economic power drives private interactions, relative political power will drive collective decision-making outcomes. In other words, the parties are bargaining with different currencies. Presumably then, the implicit, mediated, bargaining process involving affected interests that occurs in a regulatory environment must ultimately appeal to a political resolution of competing claims. This resolution may be reflected in the terms of reference or composition of any agency to whom government has delegated the power to set standards, or may occur through appeal, immediately or ultimately, to the political process. Thus, the incentives driving parties to some mutual accommodation of competing claims is the "shadow" of a politically imposed resolution of their claims.

Structuring this implicit bargaining process, then, requires that policies be formulated on the terms and nature of participation of affected interests in the regulatory process, on the qualifications and appointment procedures for members of any regulatory body involved, on the terms of reference under which such a body is to operate, the powers with which such a body is invested (e.g., the power to deploy subsidy policies), and on the linkages between this body and the political process generally (i.e., the executive and legislative arms of government). These issues are addressed in some detail in the chapter on direct standard-setting later in this study. How these variables are resolved will substantially affect the question of whether implicit bargaining processes in the context

of collective forms of intervention are likely to yield different substantive outcomes from those that are likely to be arrived at through the various, differently structured forms of explicit bargaining processes reviewed earlier in this chapter. Without attempting to review here in any detail the possible impact of all of these institutional variables on the nature of bargaining outcomes, some general observations may be in order.

A. The Economic Framework

In terms of our economic framework, once one moves from a set of private interactions in explicit markets, driven by relative economic endowments, to a set of interactions in the political marketplace, driven by relative political endowments, even if in response to perceived forms of market failure in an economic sense, the inference cannot be drawn that collective responses will be limited to correcting those forms of market failure. Political incentives, largely deriving from the principle of majority voting rules within which collective decision-makers operate, will tend to lead to policies with a substantial redistributive intent as politicians seek to forge minimum winning coalitions of voters in order to maximize their prospects of election or re-election. Thus, for example, if in collective decision-making environmental interests are accorded a degree of influence commensurate with their members, it is quite conceivable that they would promote, and indeed possibly secure, policies that reduce environmental exposure to zero, given that this generates maximum benefits for them while the

costs of such policies are borne by other constituencies. This outcome is unlikely to be consistent with Pareto-optimal levels of safety/risk. The same may well be true of workers in an occupationally hazardous industry who, if their numbers are such, may find it in their interests to promote occupational health policies that reduce health risks below what the concept of Pareto optimality would imply, provided that the costs of these policies can be imposed on politically less influential constituencies (e.g., the general body of taxpayers who may be required to underwrite a subsidy programme).

B, The Ethical Framework

In terms of our ethical framework, two divergent concerns may emerge. To the extent that whatever collective decision-making processes are chosen do not equalize political influence on a per capita basis affected constituencies, inequalities of economic endowments that from a distributive justice perspective might be thought to have made the outcomes of private market interactions ethically unacceptable, are likely to perpetuate inequalities of influence in the political process¹⁶ and continue to violate distributive justice imperatives. Thus, if suppliers of capital are permitted in collective decision-making to use their superior economic resources to "buy" political influence through, for example, political lobbying or more vigorous and substantial regulatory interventions, less economically well-endowed suppliers of labour are likely to face similar outcomes from interactions in political markets as those they faced from interactions in private market activities.

On the other hand, even if political influence is equalized, workers then run the risk that numerically more politically salient interests (e.g., consumers) will insist on policies that do not contemplate expenditures on occupational safety which substantially increase the price of the products in question. If the right to safety is perceived as an ethically special kind of right that should not be subjected to a majoritarian (utilitarian) calculus, then this outcome too is ethically unacceptable. Thus, how the assignment of special ethical weight to the right to safety in collective decision-making is to be institutionally protected poses very difficult questions, given vulnerabilities both in settings where political influence has not been equalized and where it has.

C. The Scientific Framework

In terms of our scientific framework, designing collective decision-making processes that are in some sense politically and ethically acceptable (whatever violence they may do to norms of economic efficiency in a Pareto sense) must also confront the task of ensuring some capacity to generate and interpret complex scientific information, on the basis of which informed political preferences can be reached. A collective decision-making agency that appropriately structures bargaining interactions among affected political constituencies (e.g., by representative composition) may not necessarily possess the same capacity or credibility in addressing and resolving complex issues of scientific controversy and uncertainty. This again reflects the tension between cybernetic and analytic paradigms of decision-making.

D. The Political Framework

In terms of our political perspective, structuring whatever collective decision-making agency is immediately charged with making and/or administering policy with respect to health risks so as to comport with whatever imperatives derive from the other three frameworks, fails to account for the fact that this agency will have received, and continue to receive, its essential policy-making signals from the political process at large. Thus, any attempt to structure the immediate collective decision-making agency so as to satisfy some set of normative principles remains vulnerable to the prospect that these principles will, in part, be subverted by wider political forces which have remained untouched by more discrete institutional reforms. On the other hand, the chosen instrument may, reflecting a cybernetic paradigm, possess some potential for shaping as well as responding to political preferences in the processes of interactions it sets in train. However, while wider political forces remain governed by existing configurations of influence, the political prospects for setting up initially an institutional apparatus in the regulation of health and safety hazards that assigns significantly different degrees of influence to constituencies than the influence possessed by these constituencies in the wider political process may be relatively bleak.

Notes to Chapter 6

1. Much of this literature is reviewed in Trebilcock, Waverman, and Prichard, "Markets for Regulation," in Government Regulation Toronto: Ontario Economic Council, 1978); see also Trebilcock, Hartle, Prichard and Dewees, The Choice of Governing Instrument, Regulation Reference, Technical Report No. 12 (Ottawa: Economic Council of Canada, 1981); more generally, Mueller, Public Choice (Cambridge: Cambridge, Univ. Press, 1979).
2. R.S.O. 1980, c. 321.
3. R.S.O. 1980, c. 321, s. 29(6).
4. Ontario Ministry of Labour, Occupational Health and Safety Division. "Proposed Regulation Under The Occupational Health and Safety Act, 1978 and Related Codes: Asbestos -- Designated Substance," mimeographed (Toronto: 22 September 1981).
5. 15 U.S.C. § 2051 (1972).
6. S. 3.
7. R.S., C. H-3.
8. Harper & Row, 1975.
9. For a general and perceptive review of the strengths and limitations of collective bargaining about safety issues, see Lawrence S. Bacow, Bargaining for Job Safety and Health (Cambridge: M.I.T. Press, 1980).
10. See e.g., Jensen and Meckling, "Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure," Journal of Financial Economics 3 (1976): 305; Fama, "Agency Problems and the Theory of the Firm," Center for Research in Security Prices, Working Paper No. 20 (Chicago: University of Chicago, 1978).
11. See Goldberg, "Regulation and Administered Contracts," Bell Journal of Economics 7 (1976): 426-448.
12. See Schuck, "Litigation, Bargaining, and Regulation," Regulation (July/August 1979): 26-34.
13. Fuller, "The Forms and Limits of Adjudication," Harvard Law Review 92 (1978): 353-409.
14. See Engelhart and Trebilcock, Public Participation in the Regulatory Process: The Issue of Funding, Regulation Reference, Working Paper No. 17 (Ottawa: Economic Council of Canada, 1981).
15. See Edelman, The Symbolic Uses of Politics (Champaign: University of Illinois Press, 1967); Randall Bartlett, Economic Foundation of Political Behaviour (New York: Free Press, 1973), chapters 17 and 18.
16. See ibid., Part V.

CHAPTER 7 CIVIL AND CRIMINAL LIABILITY

CIVIL LIABILITYI. Introduction

The New York Times recently reported ¹ that "damage claims by workers exposed to asbestos and by their families now constitute the largest, and potentially most costly, block of product liability litigation ever to confront American industry." About 25,000 people who believe they are victims have filed 12,000 suits against 260 companies that manufacture, use or sell asbestos products. Each month, more than 400 new suits are filed against the Johns-Manville Corporation of Denver by those claiming injury from exposure to asbestos. This is an increase from 150 a month last summer, and as of May, 1981 Johns-Manville had been named in a total of 7,200 suits, many with several plaintiffs. Auditors have qualified Johns-Manville's earning statements for 1979 and 1980, indicating that they believe the company's potential liability is so unpredictable that the earning reports may not fairly represent its financial condition. An industry spokesman's estimate of industry-wide litigation places the amount of money at stake at between \$120 billion and \$150 billion, exclusive of the indirect costs that might result from bankrupting some businesses. The spokesman is quoted as saying: "The numbers scare the hell out of me." Clearly, the potential role of civil liability in responding to asbestos-related health hazards is of considerable consequence.

II. The Economic Framework

In the economic framework previously outlined the goal of any policy should be to replicate the outcomes of a perfectly functioning market. What this section will therefore do is evaluate the different policy instruments available within the private law enforcement field and see how well they promote this goal. This will entail an evaluation of considerations of allocative, dynamic, and administrative efficiency. The ability of an instrument to attain the optimal solution will be evaluated in terms of its ability to meet these criteria. The policy instruments chosen for analysis include the negligence regime, private enforcement of public standards, strict liability, and class action suits.

A. Negligence

The tort liability regime serves two major goals. Firstly, it provides a means whereby victims of accidents can be compensated for their loss. Secondly, it can determine the proper level of safety through cost internalization.² It is the second goal which we will be examining here. That is, our main concern is with the ability of the tort system to cause the appropriate amount of safety precautions to be undertaken.

1. Allocative Efficiency

It may be useful at this point to recall that in a perfectly functioning market the safety/risk optimum is the point where the marginal cost of avoidance is equal to the marginal benefits derived

from accident avoidance. What the tort liability regime should attempt to do, then, is to force firms to invest in safety measures until the optimal level of safety is attained. In theory, tort law can do a good job of leading companies to the optimal amount of safety precautions. Under the Learned Hand test of negligence,³ an individual or firm will be found liable for the full cost of an accident if the cost of avoiding that accident was less than the expected loss. This latter figure is the product of the probability of the damage occurring and the loss which would flow from the accident. Where prevention would have been the efficient course to follow yet was not undertaken, the company is liable to compensate the victim for his loss. The effect of this rule is to encourage companies to invest in safety so long as the expected benefits from the investment exceed the cost. Viewed from another perspective, in order to avoid being assessed the full cost of an accident, companies will undertake safety measures until the marginal cost of accident prevention is equal to the marginal benefits. This point, of course, is the Pareto-optimal solution. While the Learned Hand test is rarely applied explicitly in Canadian negligence cases, an implicit cost-benefit analysis seems typically involved in weighing the burden of precautions against the benefit from precautions.⁴

While, as outlined above, the tort system can cause the optimal amount of investment in safety, its ultimate success is dependent on two essential factors. It must be possible to calculate accurately the costs and benefits of accident avoidance,

and the law must force internalization of the costs of accidents to those enterprises that are best able to control the costs. However, several factors suggest that these requirements are difficult to satisfy.

As we have seen, using the Learned Hand test of negligence or fault, liability follows when the expected benefits of preventive action exceed the costs. This test, by necessity, will require the court at least implicitly to derive figures for each of those two amounts. Failure to award the correct compensation awards will mean that the company will be reacting to false signals. It thus becomes necessary to look at each of these two functions to see what factors might affect the determination of the proper values and see what effect these factors will have on the level of safety.

(a) Assessment of Benefits of Avoidance

(i) Valuation of Loss

It has been suggested that in tort law today there is a downward bias in the valuation of the consequences of most accidents.⁵ To the extent that this occurs there will be insufficient incentives to invest in safety.

The validity of the above statement seems to be confirmed by a comparison of values for life estimated by empirical research and those that are typically reached in tort actions. One writer indicates that the estimates of value of life (taken from wage differential studies in risky industries) are between 420,000 and 2.6 million dollars.⁶ On the other hand, Pierce states that the average damage award in the United States for the wrongful death of an adult male is 240,000 dollars. The Canadian figure

is probably lower. While admittedly this makes for a very crude comparison, the magnitude of the difference is such as to suggest that courts do not provide full compensation for loss of life. Courts typically only award the monetary loss suffered by survivors and not the actual value which the person himself puts on his life. The result, using the above figures as an example, would be that a rational firm would only invest in safety until the investment required to save an additional life is \$240,000. It should actually be investing until the cost of saving a life is at least \$420,000, and possibly up to \$2.6 million (depending on what figure is taken as the actual value of life).

In addition to damage awards that do not reflect the true amount of the loss there are several other factors which can also affect the perceived benefits function. Although discussed separately below, these can all basically be summed up as a failure to fully internalize the costs associated with health and safety risks. If a firm is not forced to confront the full social costs of its activities then it will not consider these costs in its decision calculus.

(ii) Proving Causation

It is trite law that for any plaintiff to succeed in an action for damages he must be able to prove that the defendant caused his loss. Although necessary, it is by no means an easy step in cases involving health hazards.

The first problem that often arises is that it is the company alone which has the necessary information. To show causation it may be necessary to know the specific details of the mining or manufacturing process used. Although the current tort system provides for disclosure of material facts, it may be extremely costly and time consuming for an individual plaintiff to try to assemble this information. Also, since we are often dealing with a situation years after the exposure took place -- even twenty or thirty years -- the relevant information and witnesses may not be available.

Even if we assume that a plaintiff can gather the necessary information, other problems may arise because of the lack of scientific knowledge concerning the relationship between exposure to asbestos and health problems. It may indeed be difficult to establish a causal link between health problems and exposure to asbestos in the work environment. Given that a plaintiff must show that on a balance of probabilities such exposure caused his health problems, the absence of data obviously will present a major difficulty to his succeeding in the action.

A third problem with causation occurs even if all the necessary factual information is known and the causal relationships are settled. This problem will arise when there is the possibility of joint causation. For instance, if there is a forty percent chance

that a health problem was caused by exposure to asbestos, a forty percent chance that it was caused by smoking, and a twenty percent chance that it was by natural causes, the tort regime would not normally find the source of asbestos exposure liable for the loss. It is only if the probability is greater than fifty percent that liability would follow. Since the tort system is in general an "all or nothing" regime, the party either pays all of the loss or none of it. However, an efficient solution would dictate that each source should internalize all the costs associated with it. Using the above example, the source of asbestos exposure should pay forty percent of all losses, whereas the tort system would normally result in no compensation at all. Because of this outcome a company will be able to externalize a great deal of its true costs of operations.

A situation similar to the above will prevail where a person may know that his health problem was caused by exposure to asbestos but does not know the source of the asbestos. Traditional tort doctrine would hold that no liability will occur unless the plaintiff can show what the specific source was. Such a situation is exemplified by workers in the U.S. who installed asbestos insulation and are suffering from cancer. The installers worked with many different brands over the years so they cannot prove which brand has caused the cancer (even assuming that they can prove that their illness was clearly a result of asbestos exposure).⁷

One possible solution to the dilemma has been adopted in a recent Californian case.⁸ There, the plaintiff suffered from cancer as a result of a drug her mother had taken during pregnancy. Because there had been several producers of the drug, she was not able to say which specific drug manufacturer had caused her problem. However, the court held that all the producers of the drug had to share responsibility, so losses were allocated on the basis of the market share of each firm. Although it is uncertain if this approach will be followed in Canada, problems will still remain. To maintain a truly efficient solution, share of loss must be allocated on the basis of likelihood of causing harm, not simply on market share. If it is based on market share there will be no incentive for the firms to take greater safety measures since they will still be assessed for a share of losses. A Texas court has recently applied the California decision to claims by workers against asbestos manufacturers.⁹

Another approach to mitigating the plaintiff's problems of proving causation is to legislate rebuttable or irrebuttable presumptions of exposure-disease relationships. For example, the U.S. Black Lung Act¹⁰ provides that proof of the existence of complicated pneumoconiosis establishes an irrebuttable presumption that total disability of the coal worker was due to employment. Similarly, proof of pneumoconiosis and ten years' exposure to coal dust establishes a rebuttable presumption that the disease resulted from employment. This approach may sacrifice accuracy in individual cases in the interests of attaining rough justice over larger samples of employees, although

to the extent a presumption is rebuttable, one might argue that this places the burden of proof on the party best able to assemble the relevant information and in that respect improves the accuracy of judicial decision-making. Problems of operationalizing such general presumptions are likely to be substantial. Whether findings based on specific environments can be generalized to broad classes of employees and other potential victims may be questioned.¹¹

(iii) Proving Aggregate Benefits

To show fault under the Learned Hand rule, the plaintiff would appear to be faced with the task of having to prove all the benefits that would be derived from avoidance precautions. Not only must he show how he would have benefitted had the precautions been taken, but he must also show how everyone else stood to benefit. This is necessitated by the need to compare all benefits (not just a subset) with often indivisible costs. For example, an office worker might be able to show how he could have avoided cancer had certain measures been taken in the installation of asbestos insulation. However, in order to prove that the measures would have been cost-justified he faces the very difficult task of proving how others would have benefitted as well. This is an extremely difficult task.

He must be able to identify not only the workers affected, but also the factors which determine each worker's susceptibility to cancer. To the extent that the plaintiff is not able to show all the benefits from investments in avoidance precautions, the full costs of accidents will not be internalized to the cause of the health problems.

(iv) Costs of Litigation

We have already seen how the costs of obtaining information can serve as an impediment to an individual plaintiff. It may simply not make a suit worthwhile if the plaintiff must pay to have research done into all the costs and benefits of avoidance (including any scientific research into causal relationships). Even with the information it seems clear that in most instances the plaintiff would have to pay for expert analysis and interpretation of the data.

However, in addition to the above costs there are others. Litigation itself is not only time consuming but also very expensive. From the time the initial writs are filed until the time that judgment is given can take years and many thousands of dollars. Where complicated data needs to be gathered and examined these costs may be exacerbated. Given the uncertain outcomes of the process, a plaintiff may very well not initiate a suit, or he may settle for less than his actual loss, in order to save himself the time and expense of a lengthy court battle. In such an event, the company involved will not be forced to bear the full cost of its risky activities. This problem may be ameliorated by the introduction of contingent fees in individual suits and class actions with contingent fees in group claims, but these procedural changes are the subject of much controversy and are unlikely to be easily introduced in Ontario.

(v) Availability of Insurance

The availability of insurance can have an effect on the perceived benefits function in two distinct ways. Both the

victim and the company involved may have insurance to protect them against loss which may affect the amount of costs internalized.

For the worker himself the primary consequence of insurance is that to obtain compensation he need not go through the lengthy litigation process. Since compensation is available from other sources the worker would be less likely to initiate a suit against the company. The costs of the loss will actually be borne by all those who pay the insurance premiums, and not the firm which caused the loss.

The possibility of liability insurance for the company provides yet another source for externalization of costs. In theory, this should not be so. However, to the extent that risk classifications, and hence premiums, do not reflect underlying risks in particular cases companies will not perceive a close link between accidents and insurance premiums, thereby reducing the incentives for investments in safety.

(vi) Judgement-Proof or Out-of-Jurisdiction Defendant

One potential source of failure of the tort system as a system of safety enhancement is the possibility that the defendant will be judgement-proof or have exited from the jurisdiction, even if liability is established. In the latter case, judgements can often be enforced in foreign jurisdictions under reciprocal enforcement of judgements legislation, but this will often be costly and time consuming. Although we have no available data on the frequency of these problems, it seems clear that when

they do occur the costs of accidents are being allocated to the wrong party. Instead of forcing the company to pay the compensation, there would either be no compensation, or payments from another source. Whichever result occurs, the costs of the health problem would be externalized.

A system of ongoing levies on sources of asbestos exposure, with the levies forming a compensation fund for asbestos victims, might be designed, but designing such a system while leaving safety incentives intact presents problems. Recent proposals in the U.S. made by industry interests to create a fund mandated by Congress, with industry insurance, and federal government contributions, out of which compensation claims by asbestos victims would be paid¹² represent one example of a policy that would externalize a large portion of the health costs associated with asbestos, with undesirable incentive effects. Similarly, the U.S. federal Black Lung Benefit Program, which is currently financed by a flat tax on coal operators based on the amount of coal they produce, provides little incentive to improve workplace conditions since a single employer's success in reducing disease will barely affect his tax rate, which is determined by the performance of the entire industry.¹³ Only an ongoing levy that reflects the loss or expected loss experience of individual employers would preserve an efficient incentive structure. This would be similar in concept to experience rating schemes presently operating under workers' compensation legislation (reviewed in the next chapter).

(vii) Limitation Periods

The existence of limitation periods represents a further source of cost externalization in that to the extent that they prevent an otherwise meritorious action being brought they will cause firms to undervalue the benefits of injury avoidance. However, although there are several points which may give rise to concern, in our view limitation periods do not represent a major problem in most asbestos-related cases.

In Ontario today, for actions in both contract and tort, the general limitation period is six years and the time starts to run when the cause of action is complete.¹⁴ The major difference between the two types of suit is that for breach of contract the cause of action is usually complete upon the actual breach, whereas for tortious conduct the cause of action is not complete until the damage is actually suffered.¹⁵ This might have adverse implications for asbestos cases, if they were viewed as involving contractual breaches, since the damage does not usually appear until many years after the exposure to asbestos.

It seems clear that for third-party exposure to asbestos any action will lie in tort. Office workers employed in an environment which used asbestos insulation would have no contractual relationship with the producer of asbestos so they would sue in tort. The limitation period for these cases would therefore not start to run until they had suffered damage. Although

perhaps less certain it is also likely that any action which workers in asbestos industries would have would lie in tort, not contract. Thus, limitation periods will not represent a significant problem here. Problems may arise in products liability cases though since the action would lie in contract. For example, a consumer who gets cancer from asbestos in a hair dryer would not succeed in an action in contract against the retailer if the disease did not develop for many years, but he may still have an action in tort against the manufacturer.

(viii) Effect on the Level of Safety

To this point our analysis has focused on how different factors impact on either a court's assessment of the value of accident loss or on the likelihood of a company internalizing the full social costs associated with its risky activities. It is important to realize, however, that the result of these two sets of factors will be the same since they both affect the social benefits function perceived by the firm with respect to its abatement activities.

The end product of both undervaluation of loss and cost externalization is that firms will perceive the benefits of accident avoidance to be less than they actually are. This will cause the rational firm to invest less in health and safety precautions than they should, and an inefficient result will occur.

Graphically, the effect of underestimating the benefits of the avoidance function is shown in Figure 1 (at the end of this chapter). Because of incorrect assessment of the benefits, there would be a shift in the marginal benefits function from MB_0 to MB_1 . This indicates that for every level of safety the impression is given that there are fewer benefits to be derived than is actually the case. Accordingly, the level of safety that will result will be S_2 instead of the optimal result S_0 . Point S_2 is now the level of safety where the marginal perceived benefits are equal to the marginal costs of accident avoidance.

(b) Assessment of the Costs of Avoidance

On the other side of the negligence equation lies the need for a proper determination of the costs of avoidance. As with the calculation of benefits, there are certain factors which may lead a court to assess incorrectly the values associated with this function. Firms will have an incentive to exaggerate avoidance costs so as to make more accidents seem cost-justified. That is, the higher the costs associated with investments in safety the fewer will be the number of accidents that will be found to have been negligently caused by the company. Therefore, to the extent that firms are able to convince a court that costs are higher than they actually are, their liability can be reduced.

One of the principal reasons why firms may be successful in exaggerating cost functions is that they are usually the parties with the best access to the relevant information. In the industries under consideration here, the processes involved are, for the most part, complicated and technical. It is unlikely that any outsider would be able to calculate with great accuracy the costs associated with changes in manufacturing or mining processes. The only parties able to estimate these costs accurately are likely to be those involved in the industry. Also, it is the firm itself which can best estimate the effect which changes would have on the firm's or industry's competitive position. Because of this there may be a tendency for a court to accept uncritically the evidence of the company since it frequently has no alternative source of information.

Given the incentive that firms have to overestimate costs, it may be necessary for the plaintiff in any action to undertake his own research. He will want to be able to present his own views as to what the proper costs are. However, even if we assume that such a search can be fruitful this process is likely to be extremely costly. Realistically, individuals may not be able to obtain the necessary cost information, so the firm itself will remain the only source of the data.

A further difficulty in calculating the cost of avoidance will occur when it is possible for injuries to be avoided by self-protective measures by employees. Economic efficiency would

dictate that where self-protection is the least-cost method of avoidance these measures should be undertaken. Such a principle is inherent in the concept of contributory negligence as a defence to an action where the plaintiff's cost of avoidance is less than the defendant's cost of avoidance. Although in Ontario contributory negligence is not a complete defence (it only reduces recovery) employees still will have an incentive to exaggerate their own costs of avoidance. For example, they may wish to persuade a court that the discomfort associated with wearing masks while working is greater than it actually is. Again, a court will have difficulty in validating this assertion.

In addition to contributory negligence a court may have to concern itself with the issue of joint safety production.¹⁶ In the case of asbestos, given uncertain scientific knowledge, it is indeed a possibility that the least cost solution involves combined action on the part of firms and employees. Such a situation would argue for a rule which divides liability so that each party is encouraged to undertake preventive actions. This means that a court would have to calculate what the respective costs of avoidance are.

The conclusion to be drawn from this suggests that a court may face a very difficult task in determining the appropriate cost of avoidance function. Not only must it assess the firm's costs, but it must also look at the employee's avoidance costs, and the costs of combined action. In each instance the parties involved will have an incentive to exaggerate their costs, thereby affecting the determination of liability.

From Figure 1 we can see that the effect of overestimating costs is a shift in the marginal cost function from MC_0 to MC_1 . For every level of safety, the perceived costs of avoidance are higher than the actual costs of avoidance. The resultant decrease in safety will be from S_0 to S_3 as, all other things equal, this will be the new equilibrium point where marginal costs are equivalent to marginal benefits. Firms will only invest in accident prevention up to S_3 as any accident which falls to the right of that point will be cost-justified. The firm need only concern itself (from a liability standpoint) with accidents that are to the left of this point.

We have already briefly touched upon the issue of how the determination of fault is affected by the assessment of costs and benefits of avoidance. When benefits are perceived to be less than they actually are there will be a decrease in the level of safety since the area of fault is reduced. Similarly, fewer accidents will be found to have been negligently caused when costs are overestimated.

Figure 1 indicates what level of safety results when we have underestimation of benefits and overestimation of costs occurring simultaneously. When the marginal cost curve shifts to MC_1 and the marginal benefits curve shifts to MB_1 the amount of safety will decrease to S_1 from the optimal S_0 . Any accident which falls to the right of S_1 will now be perceived as cost-justified so that the company will only be at fault for any accidents which fall to the left of S_1 .

2. Dynamic Efficiency

In addition to evaluating the allocative efficiency of the negligence system it is also necessary to measure the ability of the system to ensure that over the long run we will attain efficient levels of safety. That is, we must ask whether the system creates incentives for companies to innovate in order to reduce the costs of avoidance.

On the whole, the negligence system does not respond well to dynamic efficiency considerations. Even if we assume that the system will produce the Pareto-optimal solution in the short-run there may be no incentive for firms to search for cost-justified means of improved safety performance. Although a court will insist that the firm use the least cost means presently available (by holding them to this standard), this would not force the firm to reduce costs, through innovation, over time.

A further problem with the negligence standard is that it will not force the use of more efficient substitute products over time. The system does not contemplate inter-industry comparisons, thus forcing a switch where other industries may be able to provide the same benefits at reduced costs to society. In general, firms need only conform with the generally accepted industry practice and need not do more. Firms will not be found negligent if they fail to undertake precautions which are not the norm in the industry, except under exceptional circumstances.¹⁷ For instance, if a manufacturer of asbestos insulation takes all the precautions which the industry norms require him to, he

will not be found negligent if a health problem develops. However, this may ignore the fact that it may be possible to produce an alternative type of insulation at lower social cost. The failure to take account of substitution possibilities means that an inefficient long-run solution may be produced.

3. Administrative Efficiency

The third criterion against which we must evaluate the negligence system is administrative efficiency. This is measured as the system's ability to minimize the investigative, adjudicative, and enforcement costs associated with maintaining the optimal level of safety.

The system of private enforcement (i.e., civil liability) as a whole has several characteristics which distinguish it from a system of public law enforcement (i.e., criminal penalties). For the purposes of comparison much of the literature looks at these characteristics in terms of investigative efficiency, prosecutorial efficiency, and the efficiency of sanctions; this form of analysis will be adopted here.¹⁸

There are two major factors which impact upon the relative investigative efficiency of the negligence system: access to information and the ability to utilize returns to scale. With respect to access to information, our earlier discussion indicated major inefficiencies. It is generally the company which has the information concerning the processes involved in generating exposure to asbestos and any individual will require this data if he is to succeed in showing causation. Also, to show fault

a plaintiff will need to prove what the costs of accident avoidance were compared to the benefits, and the defendant company usually has the best access to this information.

A further difficulty with the negligence regime is that it requires proof of the causation and fault issue in each individual action. This will mean that there will be a significant amount of duplication of effort. It would obviously be much more efficient to have one party do the research for all the potential plaintiffs than for each to do his own research.

One potentially significant advantage which private enforcement (civil litigation) has over public enforcement (criminal prosecutions) is that it is the individuals themselves who are often in the best position to detect when a violation has occurred. It is more efficient for an individual to prove when he has suffered health problems than for a central agency to try to determine every such incident. Also, the injured individual will have a stronger incentive to identify the 'violator.'

The recent Proposals for Class Actions under competition policy legislation¹⁹ concluded that, in terms of prosecutorial efficiencies, a system of public enforcement was to be favoured over private law

enforcement. This conclusion was based upon the wider investigative powers likely to be entrusted to a public agency and the fact that no proof of damage is required. Prichard, however, questions this conclusion, arguing that there may be instances where the lower civil standard of proof of private enforcement outweighs the benefits of public enforcement. He argues that a higher success rate may flow from use of a private civil action since the defendant would not enjoy all the protections of the criminal procedure system and a court would not have to find criminal behaviour.²⁰ Such a situation may be a significant advantage in asbestos-related cases.

With respect to the efficiency of sanctions, private law enforcement is at a distinct disadvantage. Under the private law regime damage awards are typically limited to the amount of damage actually suffered by the plaintiff. However, public enforcement can impose fines for violation to reflect the fact that the probability of conviction or apprehension is less than one. This would benefit the goal of allocative efficiency as firms could still be forced to bear the full costs of their activities, even if all breaches were not detected and prosecuted.

B. Private Enforcement of Public Standards

One of the possible alternatives to the negligence system is a regime of private enforcement of public standards. Here, the government, or a related agency, would set the desired safety levels but it would be left to aggrieved individuals to initiate civil actions for breach of the prescribed safety standards.

1. Allocative Efficiency

As with the negligence regime, the goal of the public standards system is assumed to be the attainment of an efficient level of investment in safety. However, instead of forcing the court to derive the Pareto-optimum, this alternative regime provides the court with a pre-determined appropriate level of safety. The cost-benefit analysis is done by the government agency, rather than by the court. The government agency will state, via a prescribed standard, what it has determined the optimal safety level to be, and the court will simply apply this standard in civil cases that come before it. The effect of the private enforceability of public standards is that the plaintiff will no longer have to adduce evidence on the issue of costs and benefits of avoidance. This is a potentially significant cost saving for the plaintiff. A plaintiff will not have to abandon his claim or settle for less than his loss because the cost of finding the information is prohibitive.

Although the use of a public standards system can improve upon the efficiency of a negligence regime, it is important to realize that this is dependent upon two essential factors. Firstly, the government agency must be able to calculate accurately the costs and benefits of accident avoidance, and secondly, the individual plaintiffs must be able to enforce the standards effectively.

Under a public standards regime, the government agency still faces problems in obtaining and analyzing relevant data. Information asymmetries still exist: the firm will remain the best source of information for most of the cost data, and there is no guarantee that the agency will be able to obtain it. Although the government is likely to have better investigative ability than an individual plaintiff and more power to force disclosure, the process of obtaining information will still be expensive.

A government agency may also experience some advantages over the court itself. When the court makes the determination of the standard it is limited to the information that is brought before it. There is, however, no such limitation in the case of a government agency. It can make use of any information, no matter what the source.

Despite the fact that a plaintiff does not have to derive the cost and benefit figures for a determination of fault, he still faces a major hurdle if he is to succeed in privately enforcing public standards. It is still incumbent on the plaintiff to show that the defendant company's breach of the standards caused his injury. We have discussed the problems confronting a plaintiff under the negligence regime in proving causation, and these remain present here. The plaintiff may continue to face difficulties in obtaining information from the company, in

showing the scientific causal relationship, and in showing that the defendant is responsible where joint causation exists. Failure to succeed on any of these points will mean that there will be less than a full internalization of costs, and an inefficient safety level will result.

2. Dynamic Efficiency

With respect to dynamic efficiency the public standards system is really no different from negligence. Once the agency sets the standard, firms will have no incentive to improve their abatement technology beyond that required by the standard. Also, as with the negligence regime, firms would not be forced to meet the standards of other industries even if the latter can provide the same benefits at less cost.

3. Administrative Efficiency

There are several factors which, in our view, make the system of public standards more efficient than the negligence system to administer. Although the efficiency of sanctions will remain the same, there are gains to be made within the areas of investigative and prosecutorial efficiency.

One of the primary benefits of a system of private enforcement of public standards is that the cost-benefit analysis implicit in a determination of fault need only be done once. There are three specific ways in which this can improve upon the investigative efficiency of the system. Firstly, each individual plaintiff will not have to spend resources in generating this information. Secondly, it is likely that there are economies of scale to be experienced by having the investigative duty vested in one party.²¹ The government agency will be in a better position to absorb the costs of the search process and it will be able to analyze the information better than an individual. Thirdly, there may be improvements in investigative efficiency in that the government agency will probably have greater access to the information. A public body is likely to have wider investigative power either in terms of persuasive ability or legal right, than an individual will have. Thus, with public standards the chances are better that relevant information will be disclosed.

Even with these improvements, however, there are difficulties which remain. Each individual plaintiff must still prove, on a balance of probabilities, that the defendant has caused his health problem. This requirement not only introduces the causation problem, but it also means that there will be a duplication of effort on this point. This is our main concern with investigative efficiency since there will be money spent by different individuals on the same issue. Such a position is obviously inefficient.

An additional source of concern lies in the fact that to maintain the allocative efficiency of the system it will be necessary for the government agency to constantly adjust the level of safety chosen as the standard as the costs and benefits of accident avoidance change over time. This will entail constant monitoring of the situation and such costs are likely to be non-trivial.

With regard to prosecutorial efficiency, the advantage of a lower civil standard of proof will continue to exist; there need not be criminal behaviour for a finding of liability. One new advantage, however, is that with a given safety standard there will be less uncertainty surrounding the litigation process. Since plaintiffs do not have to prove fault the parties will be more confident in the result a court would arrive at. It has been suggested that this will lead to more pre-trial settlement and less actual litigation.²² Also, where a trial does occur there will be fewer issues to dispute so a court should be able to arrive at a decision more expeditiously. The end result of both these factors is that the costs of adjudication will be less than under a negligence system. There will be a reduction in the amount of resources consumed in forcing internalization to the firm of the costs of its activities.

C. Strict Liability

Another of the possible alternatives to negligence is the use of a strict liability regime. Under such a system the defendant will be held liable for any injury he causes, regardless of whether or not there is any negligent behaviour on his part.

1. Allocative Efficiency

If we again refer to Figure 1 it is possible to examine how, in theory, strict liability can result in the Pareto-optimal level of safety. Taking MC_0 and MB_0 as the actual marginal cost of avoidance and marginal benefit of avoidance curves, a rational firm will invest in safety precautions until the level of S_0 is reached. To the left of this point it will be cheaper for a firm to make the investment to prevent accidents than to pay compensation to the victims of its activities. To the right of point S_0 a firm would prefer to have the accident occur and pay the compensation since in this area the marginal costs of avoidance will exceed the marginal benefits of avoidance.

Perhaps the most significant advantage of this regime is that it does not require either the individual plaintiff, a court, or a government agency to calculate the costs and benefits of accident avoidance. Our previous discussion has shown how this is a major source of cost externalization under a system of negligence or private enforcement of public standards. However, with strict liability it is the company itself which is forced, at least implicitly, to make the calculus. Such a situation is preferable to the others since it is the firm which has

best access to information, so it is in the best position to estimate accurately the costs and benefits of avoidance. Since the firm will have to pay compensation, even if it is not negligent, it will wish to seek out the least cost solution as between paying out damage awards and investing resources in further abatement precautions. It has a direct monetary incentive to determine exactly where the optimal level of safety is.

Although strict liability is more likely than either negligence or private enforcement of public standards to arrive at an efficient solution, problems still remain. The difficulty inherent in proving causation and the tendency of the court to undervalue the benefits of avoidance will still serve as major sources of cost externalization.

We have discussed previously how undervaluation of benefits can lead to less than full internalization of costs under a negligence regime. The situation is no different with strict liability if courts do not assess the correct level of damage, even where liability is found. As with negligence, undervaluation of benefits can be shown as a downward shift in the marginal benefits function. Thus, we see from Figure 1 that where benefits are undervalued the level of safety will drop. To the right of S_2 firms will find it cheaper to pay the court-determined compensation, instead of investing in safety up to S_0 .

A similar situation will obtain where the plaintiff is not able to show that the defendant company has caused his injury. Strict liability does not alter the requirement of having to prove causation so all the previous problems in this respect will still be present. Since inability to prove causation means that the company will not have to internalize the full cost of its activities, there will be a decrease in the level of safety. More accidents than are optimal will be allowed to occur.

In order for a strict liability regime to be allocatively efficient, consideration must also be given to incorporating defences in cases where the plaintiff would have taken cost-justified avoidance precautions (i.e., self-protective measures). It is thus frequently argued that a contributory negligence defence and perhaps also a volenti defence should be incorporated. In theory this is correct although this will mean that in many situations a court will be compelled to compare the relative avoidance costs of the respective parties, in which event the court is required to undertake a form of cost-benefit analysis, the avoidance of which has been held out as an advantage which strict liability possesses over negligence.²³

2. Dynamic Efficiency

There can be no doubt that in terms of ensuring a long run efficient solution, strict liability is better than either of the other systems we have discussed. Firms will have to pay compensation for all injuries they have caused, so they will have a clear incentive to search continuously for ways to reduce their costs of preventing accidents, or alternatively, look for ways of producing their product that do not cause as many accidents. This will lead to some degree of long-run efficiency, since firms will be investing in safety improvements until the marginal cost of such investment exceeds the marginal benefits.

A further benefit of strict liability is that it will force firms to consider alternative forms of producing the same benefits. Since a firm will, in theory, be liable for all the costs of its activities, it may find it in its interests to switch to another form of production. For example, a firm which produces asbestos insulation may find it

beneficial to start producing another type of insulation which involves lesser health risks. Thus, not only would strict liability provide an incentive for firms to reduce the costs of their asbestos-related activities, but it also provides an incentive to switch to use of substitute products which involve fewer social costs than asbestos.

3. Administrative Efficiency

From the standpoint of administrative efficiency, strict liability may be the most efficient of the three regimes that have been discussed. Although there will be little change in the efficiency of sanctions, since we are still dealing with a system of private enforcement, there can be improvements in both investigative and prosecutorial efficiency over the other civil liability regimes.

In terms of investigative efficiency, gains can be made through use of strict liability because it is the party with the best access to the cost data that is forced to take account of it. No longer need either individual plaintiffs, courts, or a government agency try to ascertain what all the costs and benefits of avoidance are. Instead, it is left to the firm itself to determine what the least cost solution is. Thus, strict liability can significantly reduce the investigative costs associated with attaining the optimal level of safety.

With respect to prosecutorial efficiency, there may be some gains because under strict liability the plaintiff has to prove neither fault nor breach of a statute or standard. Once causation is shown then, except for the assessment of damages, the issue is decided. This not only will reduce the costs of litigation itself, but it will also lead to less uncertainty about what result would obtain from litigation.

Of course, causation must still be proven before a defendant will be found liable. As we have discussed, there are several difficulties associated with the causation issue, and these will remain a major source of cost externalization. To the extent causation cannot be proven there will be a decrease in the level of safety that will occur.

D. Class Action Suits

Class action suits represent another possible policy instrument that can be employed in promoting the optimal level of safety through civil liability regimes. It must be realized, however, that class actions are a procedural device rather than a separate substantive system and their use is compatible with any of the three regimes we have discussed above (negligence, private enforcement of public standards, strict liability). Prichard defines a class action as a "procedural mechanism which brings together for a single determination the claims of numerous persons against the same defendant(s) that raise essentially identical questions."²⁴ Thus, the question we must ask is: How might class actions change the inefficiencies that may result from the above systems of liability?

It should be apparent that, in theory, class action suits can significantly reduce the costs of litigation to the individual plaintiff. For example, in the negligence system it will be less costly per person to have many plaintiffs together proving what the costs and benefits of avoidance are than to have each person bear the burden of undertaking the calculation separately. The same factors apply to a determination of the causal relationships under all the regimes. The end result will be a higher rate of internalization of costs by firms.

Although class action suits should work this way, at present in Canada there are certain procedural barriers which limit their effectiveness. Traditionally, class actions have not been permitted where class members had separate contracts with the defendant or where damages had to be assessed separately for each member. This is likely to present difficulties in asbestos cases because there may be different contracts involved, and there will certainly be different assessments of damages.

A major problem with class actions lies in the liability for legal costs. Class actions are usually brought in the name of one person on behalf of the whole class and, while class members share any award, they cannot be forced to contribute to the legal costs of the action. This obviously creates a major disincentive to sue as a class representative, on behalf of a class, especially where the result is uncertain. Not only may the class representative be liable for the entire costs of the class, but he is faced with the possibility of paying the other side's costs as well.²⁵ The result of this costs regime is that it is usually best for a class representative only to bring an action in his own name.

Thus, while class action rules can theoretically improve upon the basic substantive regimes, major procedural obstacles impede its usefulness. Without significant changes in the rules governing class action suits in Canada, now under consideration in several Canadian jurisdictions including Ontario, it is highly unlikely that they can serve as useful instruments in promoting the Pareto-optimal level of safety in asbestos-related contexts.

E, Conclusion

From our discussion of civil liability regimes within an economic framework, it appears that several conclusions are warranted. It is apparent that, among the three substantive systems of enforcement, a strict liability regime is the best mechanism for attempting to obtain the optimal level of safety. Both negligence and private enforcement of public standards are flawed to such an extent that they provide quite inadequate assurances that an efficient level of safety can be obtained. By itself, however, strict liability is not sufficient. Problems of causation remain intractable and consideration might be given to legislating rebuttable presumptions with respect to critical exposure-disease relationships. Moreover, to permit risk-shifting with respect to the costs of litigation and to realize economies of scale in litigation, there may be a need for more permissive contingent fee class action rules. Taken together, strict liability, legislated presumptions as to causation, and more permissive contingent fee and class action rules may be the most effective civil liability regime for promoting efficient levels of safety.

In addition, some consideration should be given to whether the election an employee must make under section 8 of the Ontario Workmen's Compensation Act between collecting benefits and suing persons (e.g., asbestos manufacturers) other than his employer should be retained. This immunity for others than the worker's employer does not exist in many U.S. jurisdictions and in part explains (along with procedural differences) the much greater volume of asbestos-related litigation in the U.S. than in Canada. In the event that a civil right of action for breach of publicly prescribed standards were to be preferred

to a strict liability regime, then an argument might be made that the immunity from suit enjoyed by employers under The Workmen's Compensation Act should also be reconsidered, given the clear evidence of culpability implied in such violations. If such an immunity were to be withdrawn in this context, either workers' compensation benefits would be collected pending resolution of the civil action and then simply deducted from the award, or, if a very aggressive set of incentives to engage in private enforcement initiatives were thought desirable, retained in addition to the civil recovery. This would reflect a rationale similar to that underlying the treble damage suit provided for in U.S. antitrust law where necessarily incomplete public enforcement has been thought to warrant creating strong incentives for supplementary private enforcement.

III. The Scientific Framework

In civil liability claims involving judicial determinations of complex scientific or technological questions, there are a number of factors warranting circumspection about the confidence and credibility that a court's decisions are likely to attract.

Engler describes the differences between the legal and scientific approaches to a problem as follows:

The scientist can and must consider all available information; the lawyer's argument includes only those aspects beneficial to his client. At first glance this often makes the scientist appear to be indecisive and contradictory, whereas the lawyer appears uncompromisingly clear. But in order to arrive at the truth, the legal approach calls for an adversary opinion and finally for a jury or a judge to render a verdict. The scientific approach is based on argumentation among peers in order to come to a consensus opinion. A split decision is an acceptable outcome, but it does not indicate that someone is right and someone is wrong. Rather, it indicates that the available information can be interpreted in more than one way and that probably more detailed data are needed to arrive at a consensus.²⁶

These differences in approach trace themselves out into some particular problems when trial-type adversary processes are applied to scientific issues. Korn categorizes these problems as threefold:²⁷ the objectivity of the source of the information; the means of communicating the information to a court; and the apprehension of the information by a court.

With respect to the first category of problems, many commentators have concerned themselves with the problem of lack of neutrality of experts when these are retained and remunerated by the parties of interest. Obviously, the disputants have strong incentives to search out and retain those experts whose views are most favourable to their interests. The experts, in turn, once retained, face temptations to provide testimony that is satisfactory to their paymasters. Thus, the process of inquiry will exaggerate conflicts between experts rather than underscore or promote areas of consensus, which is what conventional methods of scientific enquiry are designed to facilitate.

These concerns have led to various reform proposals ranging over the appointment of expert advisors to a judge, the retaining of expert witnesses by the court itself, the referral of scientific or technical questions to an outside body of experts for recommendatory findings (in its most ambitious form, this proposal envisages the appointment of a permanent Science Court), or more stringent vetting of the qualifications of expert witnesses called by the parties of interest.

With regard to the second category of problems -- the communication of information to the court -- Korn points out that this usually takes the form of oral answers to hypothetical questions put by attorneys for the parties. "However, since the question is framed by an attorney seeking a particular answer, rather than a neutral

inquirer, the recital of premises becomes a vehicle for forensic argument rather than an aid to instructing the adjudicator. The expert, required to give categorical answers to the artificially framed questions, cannot explain or qualify his opinion, and is often prevented from presenting his information in the way he would consider most helpful and pertinent."

Korn goes on to point out that evidentiary rules excluding an opinion resting on hearsay or on another person's opinion seek to limit the expert's testimony to information based solely on his own first-hand observation. Korn argues that these restrictions are incompatible with the realities of modern scientific inquiry. "They fail to take account of co-operative endeavors .. they fail to acknowledge that most of the scientist's knowledge is based on hearsay -- on reading, lectures, 'shop-talk' and reports of the experiments of others." Whether oral testimony is in general an effective way of communicating complex scientific information, compared to written reports (often prohibited by various evidentiary rules), is open to question.²⁸

Apart from these problems of communication posed by the adversary process, the process also permits challenges to the professional stature of expert witnesses called by opposing parties, a prospect many potential witnesses are likely to find invidious and a disincentive to participation. As Boulding explains:

The personal interest of the problem-solver, however, is not supposed to affect the solution of the problem and even though problems may involve controversy, the controversy is supposed to be settled by some kind of appeal to the facts or

observations rather than to the character or interests of the disputants. Arguments ad hominem are considered very bad form in the scientific community, and there is a strong ethic of truth-telling and veracity.²⁹

In combination, the way in which witnesses are chosen and the way in which they are permitted to communicate their information in trial-type adversarial proceedings are likely significantly to depreciate the quality of the information placed at a court's disposal.

So handicapped, judges then face the further disability that they lack the technical competence to evaluate the competing scientific theories with which they are likely to be confronted. Moreover, despite the various reform proposals noted above, the present law appears to be that in general a court is not permitted to retain expert advisors of its own. In Phillips v. Ford³⁰ the Ontario Court of Appeal ordered a new trial in a products liability case where the trial judge and an assessor whom he had appointed carried out experiments of their own. The Court of Appeal said:

A trial is not intended to be a scientific exploration with the presiding Judge assuming the role of research director;... a Court ... cannot embark upon a quest for the 'scientific' or 'technological' truth - when such an adventure does violence to the primary function of the Court, which has always been to do justice, according to law.³¹

As Judge Learned Hand pointed out many years ago, "the trouble with all of this is that it is setting the jury [or an inexperienced judge] to decide, where doctors disagree. The whole object of the expert is to tell the jury [or judge], not facts but general truths derived from his specialized experience. But how can the jury [or judge] judge between two statements each founded upon an experience confessedly foreign in kind to their own? It is just because they are incompetent for such a task that the expert is necessary at all."³²

All of this is to say that the error costs associated with judicial determinations of complex scientific or technological questions are likely to be high relative to error costs associated with such determination by alternative public institutions, such as specialized administrative agencies of government. Moreover, in evaluating comparative institutional competence, it is worth mentioning the obvious fact that not only are courts likely to be poor evaluators of existing scientific knowledge but they possess no capacity or resources to initiate new scientific inquiry or research to improve that knowledge base.

IV. The Ethical and Political Frameworks

One of the most important contexts in which the ethical imperatives traced above have application to civil liability regimes as a policy response to quality problems is in the case of occupational health and safety. Depending on the stringency of the liability regime, it is possible in some cases that exposing firms to full liability for damage associated with their activities may render them no longer economically viable. Here employees may face the invidious choice of continuing to work in an industry where health risks are unacceptably high; or suing, closing the industry down, and having no jobs at all (or face the costs of relocation). In cases such as this, the inability of the courts as an institution to deploy subsidy policies to facilitate safety improvements or relocation, retraining or retirement decisions by employees, or otherwise respond to the distributive implications of their decisions, renders a civil liability regime an ethically inadequate response to the quality problem. In addition, to the extent that the courts are involved implicitly in the setting of safety and quality standards under negligence or nuisance regimes, it may well be argued that the nature of the adversarial process is highly unequal in terms of the information and other resources which each side is able to deploy. Moreover, there are no effective procedural devices available for enabling registration of the preferences

(even if informed) of all affected interests on the question of socially acceptable risk levels. In these ways a judicial standard-setting process violates the procedural notions of justice involving equality of participation and access outlined in our earlier discussion of the ethical framework.

With respect to the political perspective, the particular choice of a liability regime may significantly shape the political reactions of various interests to it. The choice of a strict liability regime, with evidentiary presumptions legislated on the issue of causation, and supplemented by liberal class action rules, is likely to generate substantially greater political opposition from producer interests than, for example, to a public standard-setting regime which is much less automatic in its application and is likely to provide substantial room for political and bureaucratic discretion both with respect to the formulation of standards and to their enforcement. On the other hand, a negligence regime incorporating current quality standards in the industry as the reference point which determines the standard of care, and no modifications to existing requirements of proof of causation or to existing class action rules may be a substantially more congenial policy response to industry than either a strict liability regime or private enforcement of public standards. However, from the point of view of employees,

consumers, environmentalists, etc. the burden of litigation under such a regime entails significant costs on their part and to the extent that politicians perceive themselves as facing a politically salient demand for quality enhancing policies, such a policy response is likely to be seen by these constituencies as signalling or symbolizing a politically unacceptable ambivalence in the commitment of government to responding effectively to this demand. This will especially be so if civil liability regimes require individual law-suits by aggrieved parties. Here political forces are atomized around these suits. On the other hand, if liberal class action rules were to be introduced, confrontational group politics may be promoted. For different reasons, neither prospect may be attractive to an elected politician.

Under any civil liability regime, some broad and difficult questions about the institutional competence and legitimacy of the courts as the dominant decision-making agency would have to be faced. Lon Fuller, in his noted essay, "The Forms and Limits of Adjudication,"³³ argues that formal adjudicative processes are inappropriate methods of resolving "polycentric" problems. By a polycentric problem, Fuller had in mind "a situation of interacting points of influence" where any decision option has complex and interacting repercussions across a wide range of interests and values such as is entailed on major questions of resource allocation.³⁴ Here, an adjudicative

process contemplates a form of participation involving a limited number of parties presenting proofs and reasoned arguments and strong responsiveness to the framework of the proofs and arguments on the part of the adjudicator. Such a process will not be able to give proper weight to the multiplicity of parties potentially affected by the adjudicator's decisions or to the multiple decisional criteria that are required to be applied to produce socially acceptable decisions.

In the case of polycentric problems, Fuller argues that both formal adjudication and mass voting are inappropriate decision-making processes. Instead, a managerial model or a model of reciprocity (bargaining) amongst affected interests should govern. The former model is discussed in Chapter 9 (standard-setting) and the latter model in the previous chapter and again in Chapter 9.

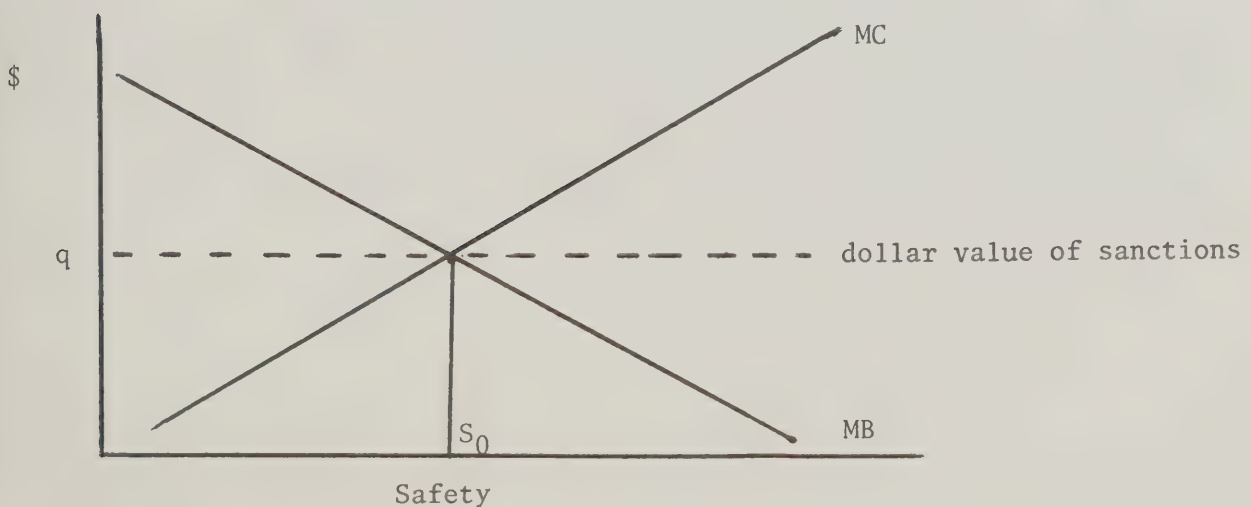
In summary, civil liability regimes do not score well on scientific ethical or political criteria. They may score better on the efficiency criterion (at least a strict liability regime supplemented by liberal class action rules), although in settings involving high uncertainty and polycentric issues, the institutional competence of courts to weigh and respond to all second- and third-order effects of their decisions is likely to be severely limited. In other words, from the perspective of both cybernetic and analytic paradigms of public policy-making, the courts exhibit severe institutional limitations in adjudicating polycentric issues.

CRIMINAL LIABILITY

I. Introduction

It has been suggested by some commentators that traditional forms of criminal liability represent another way in which society can affect the amount of investment firms will make in safety precautions.³⁵ Through the imposition of fines and jail sentences it may be possible to design an incentive system whereby firms will want to make a socially optimal investment in safety, as defined by the economic framework.

The mechanics of the criminal liability regime are strikingly similar to those of the civil liability regimes we have discussed above. Given a goal of allocative efficiency, courts will attempt to set fines (or prison terms) at a level which will encourage firms to invest in safety precautions until it is no longer efficient to do so. That is, as with civil liability, firms will invest in safety until the marginal costs of injury abatement are equal to the marginal benefits of abatement. This situation is shown graphically below.



Since the optimal level of safety is S_0 , courts will attempt to set the fines at an amount equal to q . Up until S_0 firms will prefer to avoid causing injuries since the marginal cost of abatement is less than the sanction which would be imposed if the injury was allowed to occur. Beyond S_0 , however, rational firms will let the injury occur since the costs of abatement are larger than the sanctions imposed.

Several Criminal Code offences have been suggested as potential bases of liability. In the section that follows we will look briefly at some of these offences to see what elements would have to be shown before a successful prosecution could take place.

II. Potential Areas of Criminal Liability

A. Common Nuisance: Criminal Code, Section 176

The major element in the offence of common nuisance is that, to be guilty, an individual must have committed common nuisance and thereby endangered the lives, safety, or health of the public or caused physical injury to any person. It might be argued that firms which expose their workers, or the public in general, to the dangers of asbestos, for example, are creating a common nuisance. Although there are several difficulties with this position, perhaps the most central is that it is not certain that a court would take

the view that the normal workings of a commercial enterprise constitute a nuisance. Many commercial activities represent a danger to the public (such as the manufacture of automobiles) so that this, by itself, is unlikely to be regarded as a common nuisance. Most cases involving common nuisance involve some clearly wrong activities such as blocking a road or highway.

B. Duties of Master to Servant: Criminal Code, Section 201

Section 201(a) of the Canadian Criminal Code states:

Every master who unlawfully does, or causes to be done, bodily harm to his apprentice or servant so that his life is endangered or his health is or is likely to be permanently injured ... is guilty of an indictable offence.

In the asbestos context, it might be argued that firms which expose their workers to asbestos will have breached this section because the health of the workers is endangered. The main problem with this lies in the fact that the act in question must be unlawful. It may be quite difficult to show that any action on the firm's part was actually unlawful. Although an unlawful act may occur if the firm had breached some regulatory standard it is difficult to see the advantages of a criminal prosecution if the same result could be achieved by the regulatory agency simply enforcing regulatory sanctions against the firm for the breach.

C. Criminal Negligence: Criminal Code, Sections 202, 203, 204

In most respects, criminal negligence is the offence where there is the greatest likelihood of a criminal prosecution succeeding, due to the similarities between this and the civil liability concept of negligence. Courts are likely to feel more comfortable applying negligence to the workplace than most of the other offences reviewed.

Criminal negligence is defined as an act or omission which shows wanton or reckless disregard for the lives or safety of others. Liability will follow if this negligence causes death or bodily harm to another person. An argument might be made that employers who expose their workers, or the public, to excessive levels of asbestos are thereby showing wanton disregard for safety. Despite the similarities between this and civil liability, or perhaps because of it, in our view it will still be difficult to present a successful case. Probably the only way to prove that the firm showed a wanton disregard for safety would be to show that it knew that the asbestos level in its products, or workplace, was in excess of accepted safety levels. Again one would have to ask: If this is the case why would the firm not be sanctioned directly for breach of the standard? If no standards are in place then it is unlikely that a successful prosecution could take place.

D. Manslaughter: Criminal Code, Section 217

The possibility of a successful prosecution for manslaughter, although quite speculative, deserves passing mention. Any time death occurs as a result of an arguably negligent act manslaughter may be relevant.

The Criminal Code defines manslaughter as culpable homicide which is neither murder nor infanticide. Culpable homicide occurs when death is caused either by an unlawful act or by criminal negligence. Thus, if a case of manslaughter is to be made out the prosecution would have to show either an unlawful act or criminal negligence. As discussed under the previous two offences, both of these elements would be quite difficult to prove. Thus, as with these other offences, it seems highly unlikely that any criminal prosecution would have much chance of succeeding in the asbestos setting.

III. Problems Common to all Potential Prosecutions

In addition to the problems which we have discussed under each of the potential offences, there exist barriers to success which are common to all criminal prosecutions, several of which are also present in civil liability regimes.

One of the most apparent problems is that in all the offences which we discussed it must be shown that the firm has caused some damage to the workers or public. We saw under the civil liability

regimes that proving causation for asbestos-related health problems is very difficult, and it would be no less difficult here.

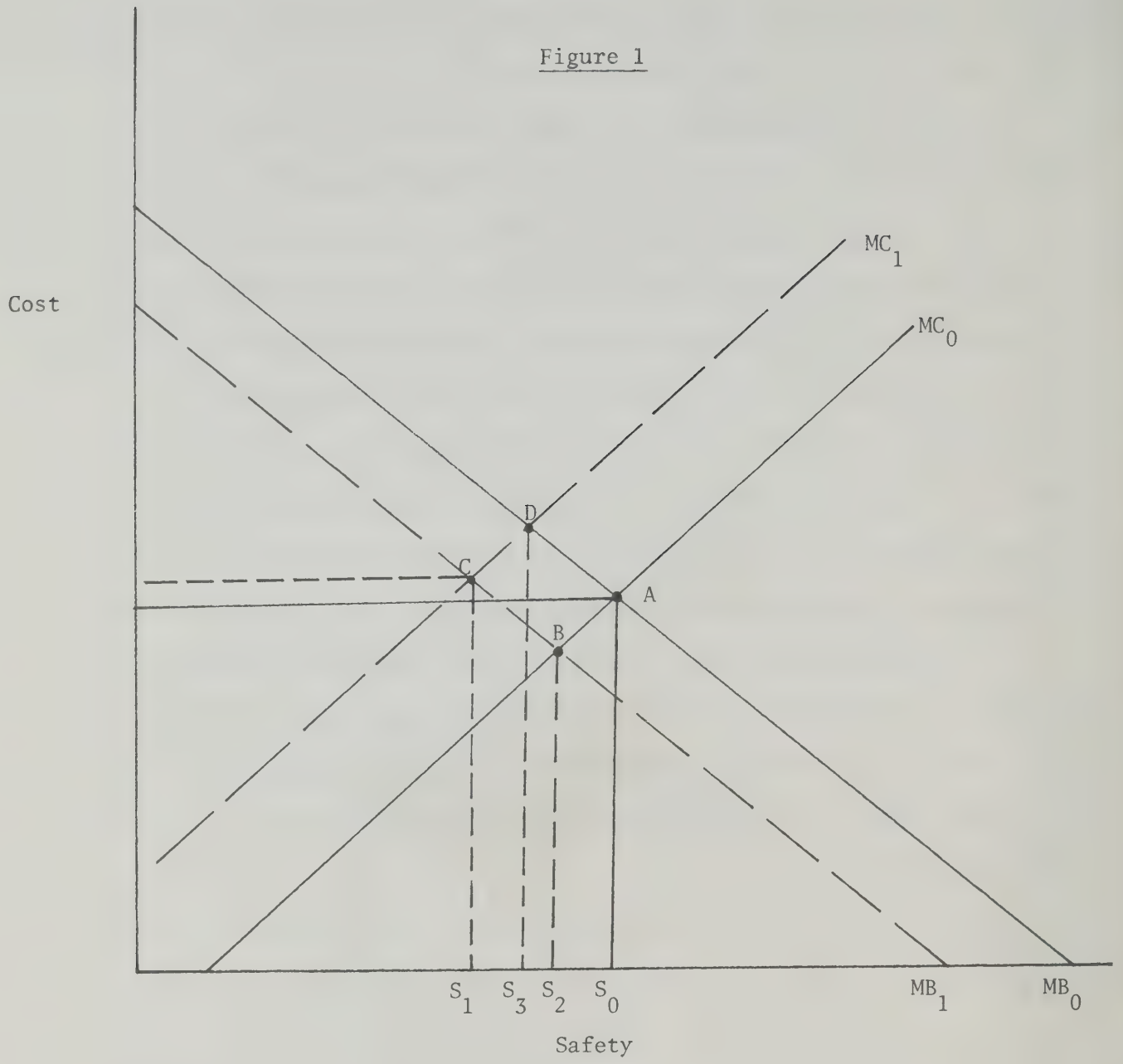
One aspect in which criminal actions differ from civil suits is that for criminal offences it is necessary to find the existence of the requisite mens rea. That is, it must be shown that the accused had the necessary 'guilty mind.' Although the form of mens rea required varies with the offence, it is likely to be difficult to prove mens rea in most asbestos contexts. First, given that vicarious liability on the part of an employer for the acts and state of mind of an employee is not generally recognized in criminal law, the prosecution will usually be required to prove mens rea on the part of the corporation itself, typically by reference to the state of mind of officers who constitute the "directing mind and will" of the corporation. This requirement has attracted much difficult and complex case law. Second, other evidentiary problems also will often arise. Prosecutions for manslaughter or criminal negligence will take place only after damage has occurred, and as explained previously this may be up to twenty years after the exposure to asbestos takes place. Also, given the state of uncertainty surrounding the causation issue a court may be very reluctant to classify behaviour as wanton or reckless when the firm may not have been aware of the consequences of its actions at the time. Even where a firm is aware of these consequences but judges them (perhaps wrongly) to be cost-justified, arguably the requisite mens rea will not be present. These issues were central

in the recent unsuccessful attempt to prosecute the Ford Motor Co. for alleged design defects in the Ford Pinto.³⁶

A final general obstacle to the use of the general criminal law in an asbestos context is that in all criminal prosecutions the Crown must prove its case beyond any reasonable doubt. Simply proving the elements of an offence on a balance of probabilities, as in a civil context, is not sufficient. The fact that an offence must be proved beyond a reasonable doubt in a criminal context makes successful prosecutions extremely difficult in any setting where scientific uncertainty and controversy, long lags between exposure and symptoms, and difficulties in identifying causation linkages are central features of that setting.

With respect to scientific, ethical, and political considerations, most of the limitations already identified in the use of the courts as the dominant decision-making agency under civil liability regimes also apply to the role of the courts with respect to criminal liability.

Figure 1



Notes to Chapter 7

1. "Asbestos Injury Suits Mount, With Broad Business Impact," New York Times, Friday 3 July 1981.
2. Richard J. Pierce, "Encouraging Safety: The Limits of Tort Law and Government Regulation," Vanderbilt Law Review 33 (1980): 1281 at 1288.
3. This test was first enunciated by Judge Learned Hand in U.S. v. Carroll Towing Co. 159 F.2d 169, (2d Cir. 1947).
4. For statements in Anglo-Canadian jurisprudence reflecting a Learned Hand test of negligence: see J. Dickson in School Division of Assiniboine South v. Hoffer, [1971] 4 W.W.R. 746 at 754, aff'd., [1973] 6 W.W.R. 765 (S.C.C.); Lord Reid in Morris v. West Hartlepool Steam Navigation Co. Ltd., [1956] A.C. 552 (H.L.) at 574; Lord Reid in The Wagon Mound (No. 2), [1961] A.C. 617 (P.C.) at 642-643.
5. Pierce, op. cit. note 2, at p. 1295.
6. Samuel Rea, "Regulation of Occupational Health and Safety," in Quality Regulation, ed. D.N. Dewees (Toronto: Butterworths, 1982).
7. For a discussion of these cases see The Wall Street Journal, 30 December 1980, p.1.
8. Sindell v. Abbott Laboratories 607 P. (2d) 924 (Ca. Ct. App. 1980).
9. Hardy v. Johns-Manville Sales Corp. 509 F. Supp. 1353 (1981).
10. Black Lung Benefits Reform Act of 1977, Public L. No. 95-239, 92 Stat. 95.
11. See Note, "Compensating Victims of Occupational Disease," Harvard Law Review 93 (1980): 916.
12. See New York Times, op. cit. note 1.
13. See Note, op. cit. note 9.
14. See Edward P. Belobaba, Civil Liability as a Professional Competence Incentive, Working Paper #9 for The Professional Organizations Committee (Toronto: POC, 1978), p. 21.
15. Ibid., p. 35.
16. For a full discussion of contributory and comparative negligence see G.T. Schwartz, Contributory and Comparative Negligence: A Reappraisal, Yale L.J. 87 (1978): 697.
17. See John G. Fleming, The Law of Torts, 5th ed. (Sydney, Australia: The Law Book Co., 1977), p. 118.

18. See J. Robert S. Prichard and Michael J. Trebilcock, "Class Actions and Private Law Enforcement," UNBLJ 27 (1978): 1 at 10 or J. Robert S. Prichard, "Private Enforcement and Class Actions," in Canadian Competition Policy, Essays in Law and Economics (Toronto: Butterworths, 1979), p. 233.
19. A Proposal for Class Actions Under Competition Policy Legislation (Ottawa: Information Canada, 1976).
20. Prichard, "Private Enforcement and Class Actions," p. 236.
21. For a fuller discussion of these factors see Prichard, "Private Enforcement and Class Actions," p. 234.
22. Isaac Ehrlich and Richard A. Posner, "An Economic Analysis of Legal Rulemaking," J. Legal Studies 3 (1974): 257 at 265.
23. See Rogerson & Trebilcock, "Products Liability and the Allergic Consumer," University of Toronto, Law and Economics Workshop Paper (Toronto: University of Toronto, 1981).
24. Prichard, "Private Enforcement and Class Actions," p. 218.
25. See D.N. Dewees, J.R.S. Prichard, and M.J. Trebilcock, "An Economic Analysis of Cost and Fee Rules for Class Actions," J. Legal Studies 10 (1981): 155 at 161.
26. Science, 23 April 1976, p. 43.
27. "Law, Fact & Science in the Courts," Columb. Law Review 66 (1966): 1980.
28. Some relaxation in these rules seems to have evolved over time in Ontario; see Sopinka & Lederman, The Law of Evidence in Civil Cases (Toronto: Butterworths, 1976), p. 316ff.
29. Editorial, Science, 31 October 1975.
30. [1971] 2 O.R. 637 (Ont. C.A.).
31. At 657, per Evans J.A.; cited in Zimmerman, "Synergy and the Science Court," University of Toronto, Faculty of Law Review (U.T.L.R.) 38 (1980): 170 at 179, 180.
32. "Historical and Practical Considerations Regarding Expert Testimony," Harvard Law Review 15 (1901): 40.
33. Harvard Law Review 92 (1978): 352.
34. At 395.

35. See, for example, Harry J. Glasbeek and Susan Rowland, "Are Injuring and Killing at Work Crimes?" Osgoode Hall L.J. (1979): 506.
36. See Richard Epstein, "Is Pinto a Criminal?" Regulation: AEI Journal on Government and Society (March/April 1980): 15.

CHAPTER 8 TAXES AND SUBSIDIES

I. Introduction

In this chapter we evaluate, within our four frameworks, the characteristics of various tax and subsidy instruments that may be employed to control health hazards associated with asbestos and similar toxic substances. What these instruments share in common is an attempt to change, in a direct fashion, the relative prices faced by firms in choosing between the imposition of health hazards on others and investing further resources in safety improvements. Tax instruments seek to achieve this objective by raising the price of non-abatement relative to abatement. Subsidies seek to achieve this objective by reducing the price of abatement relative to non-abatement.

II. The Economic FrameworkA. Taxes

Within the tax system there are several different types of taxes or tax-type policies that can be administered. These instruments include a tax on adverse health effects (i.e., a tax on health outcomes), an experience rating levy, an exposure level tax (i.e., a tax on health inputs), and a pollution rights scheme. Although different in many aspects, one common denominator amongst all the instruments is that within the economic framework each instrument seeks to achieve the economically optimal safety level.

A tax on injuries, as the name implies, would impose a penalty on firms for each adverse health impact that was demonstrated. The penalty would be set by the government so that rational firms will invest in safety until the optimal level is reached but beyond this point they will let the health effects occur and pay the tax. Similarly, an experience rating levy also imposes additional costs on firms which generate health problems. An experience rating levy is either assessed before health effects occur and is based on the probability of an adverse health effect occurring, or it can be assessed after the health effects occur. Firms which experience, or are likely to experience, a higher rate of health problems will be assessed more than other firms. An example of an experience rating scheme is administered by the Ontario Workmen's Compensation Board. The Board levies contributions on employers based on the number of injuries or health problems which occur in the workplace. The higher the level of injuries, disease, or fatalities, the higher will be the contribution required. This scheme is an example of the second type of experience rating system since the levy is assessed after the health effects occur.

An exposure level tax is a tax on the inputs to health problems since it penalizes the cause of health problems as opposed to taxing the effects themselves. In the control of asbestos this instrument could take the form of a tax based on the amount of asbestos fibres in the air in the workplace or on the percent of asbestos in products such as insulation or fireproofing material.

A pollution rights system is similar to an exposure level tax in that it too affects the price that firms have to pay for the 'inputs.' However, instead of setting a tax and then letting market forces react to it, a rights system will simply declare what amount of exposure to asbestos is optimal and then distribute rights to the various sources of risk so as to produce this level of exposure. Although this instrument has been suggested for use mainly in relation to pollution control,¹ it is possible that it could be used to control the level of exposure to asbestos. The government agency would only distribute enough exposure or emission rights so that the optimal level of safety/risk would result.

In the case of all the explicit taxes, the level of the tax is chosen, theoretically at least, so that firms will invest in safety only until the optimal level is reached. Graphically, the effect of a tax can be seen in Figure 1 (at the end of this chapter). The tax is set (by a public agency) equal to t_1 . Firms will want to avoid health effects up to S_1 , as the cost of abatement is less than the amount of the tax. Once point S_1 is reached, however, the firm will prefer to let the health effects occur and pay the tax since t_1 is less than the cost of avoiding such effects. Point S_1 is, of course, the Pareto-optimal solution where the marginal costs of avoidance are equal to the marginal benefits.

From this same Figure 1 we can also see how a rights scheme would work. The government agency would distribute rights in the amount of $S_0 - S_1$,

so that the resulting exposure or emission level is S_1 , the optimal solution. This system envisages that those parties with high abatement costs will trade to acquire these rights, while those parties which can abate at low cost will transfer away their rights.² The overall result of this scheme is that, in theory, it should provide the least cost means of achieving a given level of abatement.

As with civil liability regimes, we proceed to evaluate the tax instruments to see how likely they are to replicate the outcomes of a perfectly functioning market. This involves an evaluation of their ability to satisfy considerations of allocative, dynamic, and administrative efficiency.

1. Allocative Efficiency³

Tax instruments, in theory, possess two attractive efficiency properties relative to other instruments. First, in the case of multiple sources of a common environmental hazard, a tax will equate the marginal costs of abatement of all sources, thus achieving a given degree of abatement at least cost. Each firm will abate to the point where its marginal cost of abatement schedule equates the tax. Under a standards regime, on the other hand, each firm will be required to abate so as to comply with the standard, irrespective of its particular marginal cost of abatement schedule. Thus, firms with high cost functions will be required to abate to the same extent

this translates into lower product prices than would prevail under alternative policies. Taxpayers, on the other hand, are unlikely to be universally impressed with such a policy, particularly if they perceive themselves as having to pay to clean up a situation which firms have profited from substantially in the past and had the technological and competitive capacity to do something about. The John Stuart Mill liberal ethic, that when one person harms another, he (and he alone) should bear responsibility for the consequences, still commands its adherents,²⁰ especially when this view is congruent with one's own financial interests.

One might hypothesize that the political dynamics that are likely to surround a subsidy policy will be very ad hoc and electorally-oriented, with firms and workers in key ridings being able to invoke "pork-barrel" politics more effectively than affected constituencies in other ridings.

IV. The Ethical Framework

Tax policies suffer from some of the same ethical disabilities as civil liability regimes. To the extent that tax systems are applied strictly, a significant risk in a competitive industry earning a normal rate of return is that the industry will contract or some firms may be forced to close down. Here employees, rather than having high-risk jobs available to them, may at least in the short-run have

no jobs at all. Unlike tax policies, subsidy policies can address this concern, albeit by trading off some measure of economic efficiency.

Again as with civil liability regimes, ethical concerns may legitimately arise as to whether the essentially unstructured, low visibility, "managerial" (bureaucratic) processes involved in the administration of tax (and subsidy) policies comport with notions of procedural justice which require equality of participation and access to influence by all affected interests. Inequalities in the distribution of information and other resources, in the absence of independent corrective policies, are likely to bias the inputs into the decision-making processes involved.

V. The Scientific Framework

The scientific framework, with its emphasis on creating a credible forum for resolving scientific controversies and on the need to invest more social resources in basic research to reduce scientific uncertainties, is likely to entertain substantial reservations about a tax or subsidy approach.

The bureaucrats in charge of the administration of any tax or subsidy programme are unlikely to be perceived by the scientific community as being qualified and credible adjudicators on the

key scientific and technological relationships that must be resolved in any effective attempt to control health hazards of the kind which asbestos gives rise to. Moreover, to the extent that bureaucratic decision-making processes are closed and unstructured, the soundness of the scientific evidence or hypotheses upon which the tax or subsidy policies are constructed will not be subject to acceptable standards of independent, expert review and debate. Finally, to the extent that the bureaucratic agencies in question lack either the legal capacity or the economic resources to initiate further research on these questions, the resulting policy presumptions are likely to be considered by the scientific community to be based, at least over time, on scientific second-bests.

Given these procedural and administrative shortcomings that are typical of a tax or subsidy programme, it is a matter of conjecture whether at least partial rehabilitation of such programmes could be achieved by appropriate institutional reforms. In any event, these institutional questions form very much the heart of the ensuing chapter on standard-setting.

Figure 1

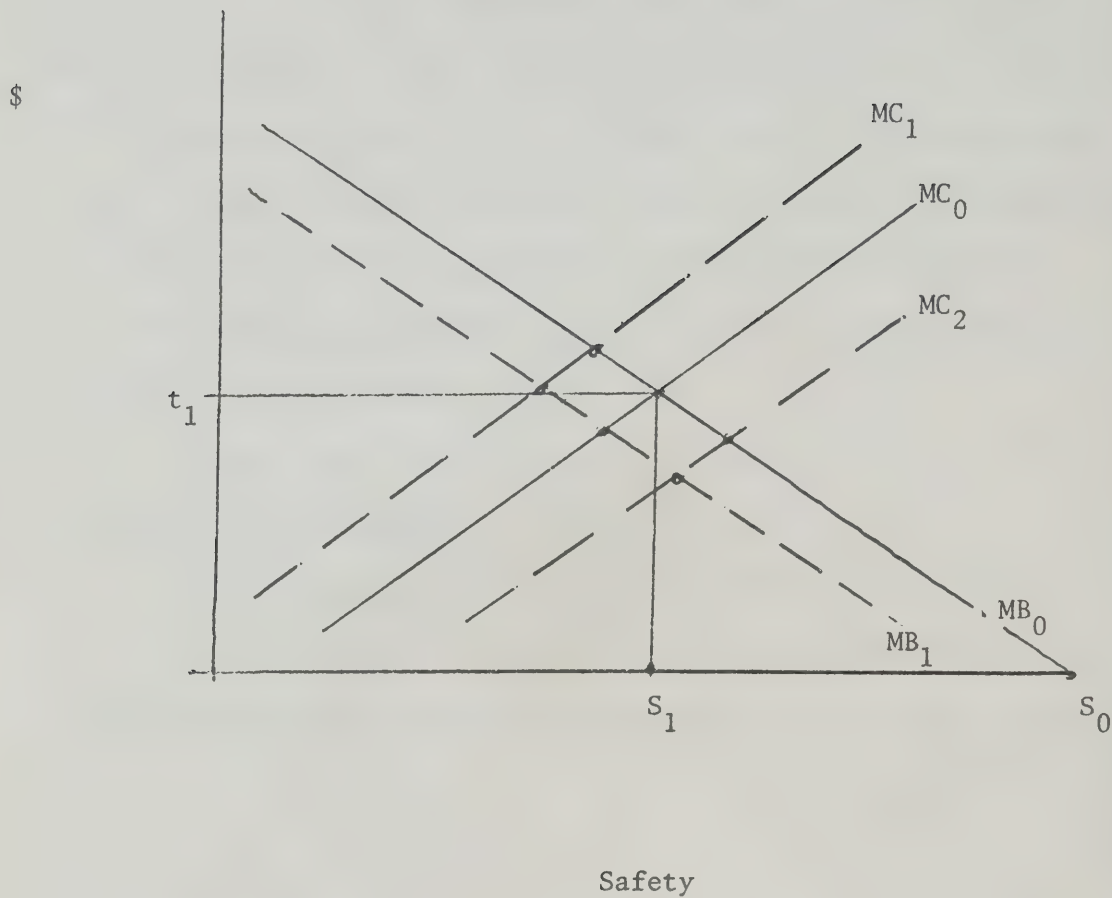
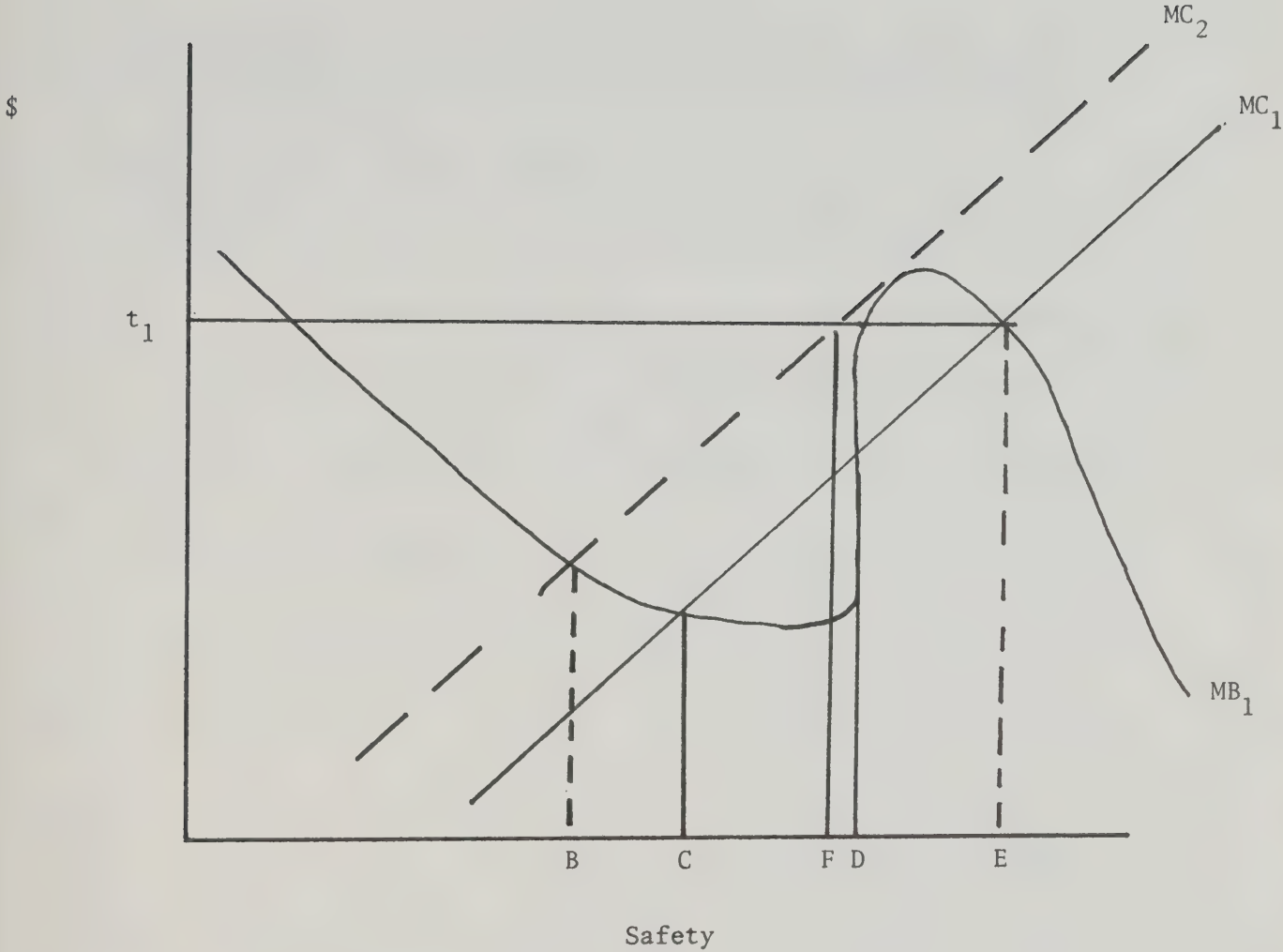


Figure 2



Notes to Chapter 8

1. See for example Brian A. Ackerman, Susan Ackerman, James Sawyer, Dale Henderson, The Uncertain Search for Environmental Quality (New York: Free Press, 1974), p. 260; John Dales, Pollution, Property and Prices (Toronto: University of Toronto Press, 1968).
2. For a full description of this model see Marc J. Roberts, "Environmental Protection: The Complexities of Real Policy Choice," in Water Quality Management: The Design of Institutions, eds. Fox and Swainson, (Vancouver, U.B.C. Press, 1975); Dales, op. cit. note 1.
3. See generally, Ackerman et al., op. cit. note 1, Roberts, op. cit. note 2; Spence and Weitzman, "Regulatory Strategies for Pollution Control," in Approaches to Controlling Air Pollution, ed. Friedlander (Cambridge: M.I.T. Press, 1978).
4. Spence and Weitzman, op. cit. note 3, at p. 209.
5. Robert S. Smith, "The Feasibility of an Injury Tax Approach to Occupational Safety," Law & Contemp. Prob. 38 (1974): 730.
6. Note, "Compensating Victims of Occupational Disease," Harvard Law Review 93 (1980): 916 at 923, 925.
7. Jeffrey Egner, "Personal Injury Awards and Workmen's Compensation," U.W.O. Law Review 18 (1980): 269 at p. 282.
8. For a full explanation of this experience rating mechanism see Egner, op. cit. note 7, at p. 287.
9. Roberts, op. cit. note 2, at pp. 183, 198.
10. Ackerman et al., op. cit. note 1, at p. 280.
11. Roberts, op. cit. note 2, at p. 188.
12. Dewees, Everson, and Sims, Economic Analysis of Environmental Policies (Toronto: Ontario Economic Council, 1975), p. 118.
13. Spence and Weitzman, op. cit. note 3.
14. This proposition also reflects much of the economic literature on optimal criminal sanctions: see Posner, Economic Analysis of Law, 2nd ed. (Boston: Little, Brown, 1977), chapter 7.
15. William J. Baumol and Wallace E. Oates, The Theory of Environmental Policy (Englewood Cliffs: Prentice-Hall, 1974), p. 173.

16. William J. Baumol and Wallace E. Oates, Economics, Environmental Policy, and the Quality of Life (Englewood Cliffs: Prentice-Hall, 1979), p. 247.
17. Roberts, op. cit. note 2, at p. 205.
18. Much of this analysis is drawn from Trebilcock, Hartle, Prichard, and Dewees, The Choice of Governing Instrument: Some Applications, Regulation Reference, Technical Report No. 12 (Ottawa: Economic Council of Canada, 1981), chapter 7.
19. Kelman, "Economists and The Environmental Muddle," The Public Interest 64 (1981): 106.
20. See e.g., Epstein, Strict Liability (San Francisco: Cato Institute, 1981).

CHAPTER 9 STANDARD-SETTING

I. The Popularity of the Approach

The most common governmental response in Canada and elsewhere to the health hazards posed by asbestos has been the establishment and enforcement of maximum permissible levels of exposure. As argued earlier, there are compelling political reasons for the popularity of this response across jurisdictions and even across types of political systems. It enables governmental decision-makers to be seen to respond to a broad and diffuse constituency of concern over health hazards while maintaining sufficient flexibility to bargain with those concentrated interests who hold vetoes over effective policy development and implementation. The promulgation of a control standard, which is usually expressed as a maximum exposure level, measured on a graduated numerical scale (as fibres per cubic centimetre or less commonly as micrograms per cubic metre) is well-suited to these political purposes. Such a response symbolizes control while allowing for negotiation over the level at which the standard is to be set and the de facto range around this standard within which exposure levels are judged acceptable in the enforcement process. These potential political advantages depend to a large degree, of course, upon the characteristics of the standard set and of the standard-setting process itself.

Furthermore, more than any other instrument under review, the design of the standard-setting process can potentially be adjusted to take account of ethical considerations, to redress imbalances in the ability of affected interests to influence decision-making about health hazards. The realization of these ethical advantages, however, is not likely to occur without the sacrifice of some political advantages. Both political and ethical considerations, in other words, argue in favour of a programme of administered controls on exposure; but the two frameworks may well dictate different designs for such a programme.

A standard-setting approach also offers several scientific advantages. More than private bargaining, or judicial or fiscal instruments, it can be structured to provide for direct scientific participation in the determination of exposure levels. And in comparison at least to private bargaining and judicial instruments, it is likely to generate through its monitoring component a more consistent, comprehensive, and centralized record of exposure levels over time.

Strong support for this policy option, then, can be generated from political, ethical, and scientific perspectives. It is primarily from an economic perspective that a programme of administered standards appears less attractive.

Economic analysis, as we have seen, demonstrates that market forces are unlikely to lead to a socially optimal allocation of risk. But it demonstrates as well that the various informational difficulties which hamper the efficient operation of the market are also likely to lead to errors on the part of standard-setters, even assuming they seek to approximate efficient market outcomes. Furthermore, to the extent that the programme is designed to take account of distributive concerns on political or ethical grounds, Pareto inefficient outcomes may well be chosen over Pareto efficient outcomes. Socially acceptable levels of risk, in political or ethical terms, may not be socially optimal from an economic perspective. Despite these fundamental critiques of administered standards as a means of achieving socially optimal levels of risk, however, economic analysis does discriminate among different programme designs on the basis of their relative efficiency in enforcing exposure levels, once the levels themselves have been established.

The extent to which the potential political, ethical, and scientific advantages of a programme of administered standards are realized, and the relative efficiency with which they are realized, depends upon the design of the programme: on how and by whom standards are set. It depends, in other words, upon the decision rules employed, and the institutional framework within which they are employed.

In this chapter, we shall outline the characteristics of a standard-setting process as it might operate most effectively with respect to health hazards such as asbestos. Our discussion is cast so as to be generally applicable; we shall not address the design or reform of specific institutions. Similarly, the issues which we address are those which arise in the setting of standards for hazards in either the workplace or the general environment. We shall not for the most part distinguish between these two arenas in the following discussion, although we shall briefly discuss some political differences that might mitigate the effectiveness of standard-setting in the environmental arena and might call for some adjustments to the policy.

II. Decision Rules

Much of the current controversy surrounding the design of standard-setting systems involves the extent to which decision-making can and should be guided by an analytic paradigm. Within that paradigm, the setting of a standard involves three intellectually independent steps: the determination of the probabilities of various health and technological outcomes of the use of the alleged hazardous substance; the attaching of positive and negative social values to those outcomes; and the selection of that level of use or exposure which yields, if not the maximum net expected benefit, at least acceptable levels of expected costs and benefits.

As we have seen, there is some support for such an approach from each of the four perspectives we have been discussing. From a scientific perspective, the separation of the estimation of probabilities of outcomes from the valuation of those outcomes is a crucial tenet of the scientific method. This tenet structures the design of the ideal experimental technique in epidemiology: the "double blind" clinical trial in which the investigator as well as the subjects are unaware of whether they are dealing with the test or the control substance in a given case. Both ethical and economic perspectives emphasize the importance of explicitly identifying expected values and their tradeoffs: ethically, to be clear about the distribution of costs and benefits; and economically, to identify the welfare maximizing point at which marginal expected costs equal marginal expected benefits. From a political perspective, it is important for a political decision-maker to be aware of the incidence of costs and benefits among his various constituencies of support.

In practice, however, divergences from the precepts of the analytic paradigm are commonplace. Probability estimates of outcomes appear to vary according to the valuation of the outcome. Certain types of costs are consistently ignored or underestimated, others overestimated.

To some extent these observed patterns of behaviour are the result of the imposition of another analytic framework, a political calculus, in which a consideration of political costs and benefits leads to biases in the estimation and reporting of health and technological outcomes. Of equal and perhaps greater importance in explaining such behaviour, however, are certain cognitive predilections which have been consistently observed but which do not derive from an analytic paradigm.

We have set up and referred to this contrast between analytical and 'cybernetic' decision-making at several points in this paper, but nowhere is it more apparent than in the questions of whether standard-setting programmes should be established and how they should be designed. Can a standard-setting programme impose an analytic rationality upon the determination of levels of exposure to hazardous substances? Should this framework be imposed, or is a programme design based on cybernetic principles more attuned to the realities of human decision-making and hence more feasible? These general questions resolve in practice into debate over the relative merits of a number of decision rules as guides to the determination of acceptable risk.¹

A. Zero-Risk: The 'Delaney' Principle

On its face, the simplest decision rule would appear to be to tolerate no risk. This is the principle behind the 1958 Delaney Amendment to the Food, Drug, and Cosmetics Act at the federal level in the United States, which prohibits the introduction to food of any additive found to be carcinogenic in either animals or humans. Milton Wessel has noted that the Delaney Amendment occurred at a time when the post-war optimism about the ability of society to control its technology was beginning to fade, to be succeeded by a sense of technology run amok.² In that context, a clear and simple refusal to tolerate certain life-threatening aspects of an increasingly complex technology (despite the seductive benefits of that technology) offered a renewed sense of control. A categorical rather than a probabilistic definition of 'acceptable' and 'unacceptable' conditions continues to have a strong cognitive and ideological appeal.

In its purest form, the zero-risk principle involves a ban on the use of a hazardous substance. Somewhat less Draconian forms of implementation include the reduction of exposure to the substance in question either to a

zero level or to a "safe threshold." Because these latter forms of implementation are inherently probabilistic and uncertain however, they comport less well with the categorical nature of the zero-risk principle. The dynamics of the policy process differ somewhat according to whether what is at issue is a ban, zero exposure, or a "safe threshold."

In practice, because of the very simplicity and severity of the instrument, attempts to implement the zero-risk principle through the imposition of a ban may lead to either substantially higher or substantially lower levels of protection against health risks than might prevail under other decision rules. In the political debate surrounding hazard control, the imposition of a ban is likely to turn less upon scientific evidence than upon political mobilization. Of all policy responses, it offers the highest rewards to successful political mobilization -- the winner literally takes all.³ Despite the fact that under this principle no risk is to be tolerated whatever the potential benefits, the beneficiaries of the continued use of a suspect substance (that is, the bearers of the costs of a ban) will introduce considerations of foregone benefits into the political debate while seeking to minimize evidence of risk. In such circumstances, unless the scientific evidence is overwhelming, science itself is unlikely to determine the outcome. Science does not lend itself to categorical judgement. The results of epidemiological surveys and bio-assays are probabilistic in two senses: they estimate risk; and the estimates themselves rest upon statistical techniques which offer less than one hundred percent confidence in their accuracy. Typically, then, scientific evidence might offer ninety-five percent confidence that a substance carries a two percent excess cancer risk for exposed persons. Opponents of the ban are likely to seek to exaggerate the uncertainties about scientific evidence, through methodological critiques of bio-assays and epidemiological

surveys such as those discussed in Chapter 2. To a large extent, then, they will focus the debate on the question of how sure we must be that a substance is risky before entirely foregoing its benefits.

Proponents of the ban are likely, on the other hand, to defend scientific evidence, but also to supplement it with reference to individual cases of disease incidence at allegedly very low levels of exposure. Such cases may have a persuasive power far beyond their scientific merit, appealing as they do to cognitive preferences for specific cases as opposed to probabilistic data, and to the emotional significance of identifiable suffering. Furthermore, proponents of the ban may attribute an infinite value to human life so that even a low level of certainty regarding a low level of risk outweighs any level of benefit associated with the suspect substance. "If only one life is saved," we sometimes hear, "this ban will have been worthwhile." But unless such proponents are prepared to argue that all threats to life must be eliminated, the no risk principle needs to be supplemented in a given situation by a principle which discriminates among types of risk on qualitative if not quantitative grounds. (It can be argued, for example, that there is a stronger case for refusing to tolerate risks which are unwittingly or involuntarily assumed.)

However arbitrarily a ban may respond to the balance of these political forces, it is at least likely to be a relatively more stable policy outcome than are other instruments embodying the no risk principle -- the reduction of exposure to zero or to a safe threshold. Under a ban (unless it is selectively imposed or unless a black market develops), producers and consumers of the banned substance eventually adjust to its absence and dissolve as political constituencies. Where a substance remains in production on the other hand, political constituencies of beneficiaries and potential risk bearers remain in existence.

The stability of the outcomes, moreover, is further dependent on the rate of change in the relevant scientific and technological fields. Holding exposure levels to a perceived "zero" level may become increasingly difficult and costly as improvements in technology make it possible to detect smaller and smaller concentrations. Similarly, the uncertain and probabilistic nature of the definition of safety thresholds leaves them open to revision on the basis of new scientific evidence. And finally, given the persistence both of political constituencies of beneficiaries and risk-bearers, and of scientific and technological uncertainty, these modified forms of implementing the zero-risk principle are susceptible to continual challenges on the grounds of anecdotal evidence and identifiable suffering similar to those surrounding the imposition of bans.

B. Technological Feasibility

Several jurisdictions tie the reduction of risk to the capability of control technology by requiring that risk be reduced to the extent possible with the "best available technology" or the "best practical means." This rule has been involved, in or under environmental protection legislation in Sweden and the United Kingdom.⁴ Standing alone, such a rule offers an incentive for those who bear the initial cost of that technology to develop more cost-effective technology, but no incentive to develop technology that offers greater protection. Furthermore, although a technology-based decision rule can be used to foster the development and diffusion of improved control technology, its more usual purpose is to provide for standards to be adjusted to local conditions.

More typically, however, technology-based criteria have been interpreted to imply economic as well as technological feasibility and have provided channels for the introduction of explicit cost-benefit analysis in the selection of standards. As Nemetz et al. have put it, "'best' implies some consideration of benefits from the regulation, while 'practicable' implies

attention to economic feasibility."⁵ Under British environmental protection legislation, a 'best practical means' rule has been interpreted as implying a consideration of 'costs, the state of technology, and local conditions';⁶ and Swedish environmental regulatory agencies employ a similar interpretation.⁷

To a greater extent than a full commitment to cost-benefit criteria, however, technology-based criteria allow for flexibility in dealing with the regulated industry, allowing standards to be adapted to technological constraints in particular localities or industrial subsectors. While this feature is one of the major strengths of the approach, it can also constitute a fundamental weakness. It may imply or be seen as implying virtual industry self-regulation, or inordinate capitulation to local political considerations. In any case, however, the rule is likely to lead to relatively stable outcomes, particularly where regulators and hygiene technologists in industry share a common professional background. It is extremely difficult for those without access to technological information and expertise to challenge the application of technology-based criteria -- the more common strategy is to challenge the decision rule itself.

C. Weighing Costs and Benefits

Increasingly, regulatory decision-makers are being pressed to make their decisions on the basis of an explicit weighing of costs and benefits of alternative policies, choosing only those alternatives whose benefits justify their costs. This pressure has recently been most apparent at the federal level in the U.S., where the Reagan Administration has underlined its commitment to government "efficiency" with an Executive Order to all federal agencies (including OSHA and EPA, but excluding independent commissions such as the FTC) requiring them, subject to the provisions of their enabling legislation, to apply cost-benefit analysis to all their

rule-making, and to base their decisions on cost-benefit criteria. This directive is to be enforced by the Office of Management and Budget, which is empowered to review all "major" rules before publication, to conduct its own cost-benefit analyses, and to make such revisions to rules as it deems necessary, subject to appeal to a Cabinet-level task force. The newly appointed heads of OSHA and EPA, moreover, have announced their commitment to a cost-benefit approach.⁸

The Executive Order is the latest and strongest example of a tightening of cost-benefit requirements in the U.S. federal government. A 1975 Executive Order of the Ford Administration required that new agency regulations and legislative proposals be accompanied by "inflationary impact statements." In 1978, President Carter issued an Executive Order requiring that all regulations with "major economic consequence" be made on the basis of cost-effectiveness criteria, and established a Regulatory Analysis Review Group (an informal interagency task force chaired by a member of the Council of Economic Advisers) to review agency rules after publication. Furthermore, there has been continuing pressure -- so far unsuccessful -- through the legislature and the courts to revise or re-interpret environmental and occupational health protection legislation to impose cost-benefit requirements on regulation-making thereunder.

Proposed amendments to the Occupational Safety and Health Act imposing such requirements, for example, have died at the Congressional committee stage. As it stands the Act provides that standards made thereunder are to assure "to the extent feasible...that no employee will suffer material impairment of health or functional capacity."⁹ OSHA has interpreted this language to mean that OSHA is constrained from promulgating a standard under which a substantial proportion of capital would be driven out of an industry (OSHA refers to 'massive economic dislocation'); but not to require that the expected benefits of a standard be proportionate to its costs.

Extensive litigation has so far not resolved this issue. But the most recent U.S. Supreme Court decision, involving OSHA's cotton dust standard, was particularly significant, coming as it did on the heels of Reagan's Executive Order. In a highly unusual move, the Reagan Administration requested that the Supreme Court not decide the cotton-dust case, but rather vacate the appellate court decision and send the policy back to OSHA for reconsideration in the light of the recent Executive Order. In fact, the Court decided the case, ruling that "Congress itself defined the basic relationship between costs and benefits by placing the 'benefit' of worker health above all other considerations save those making the attainment of this single 'benefit' unachieveable."¹⁰ This decision has now thrown the conflict back into the executive and legislative arenas amid suggestions by Labor Department officials that OSHA is now probably legally unable to comply with the President's Executive Order,¹¹ and renewed rumblings regarding the insertion of specific cost benefit language into the Occupational Safety and Health Act.¹²

In Canada, the mandating of cost benefit analysis has not proceeded to such lengths. At the federal level, however, a Treasury Board Directive has required since August 1, 1978 that all major new regulations relating to health, safety, and fairness be accompanied by a Socio-Economic Impact Analysis, which is to be available to the public for comment. In principle, the SEIA is to weigh costs against benefits; in practice, such analyses as have been undertaken in the field of environmental protection have concerned only the cost-effectiveness of proposed policies. (That is, they have been concerned with the selection of the least cost means to a given objective as opposed to the choice among alternative packages of costs and benefits.)¹³ The most extensive review of regulatory policy conducted in Canada -- the Regulation Reference of the Economic Council of Canada -- has provided some support for a policy of mandating cost-benefit analyses of proposed regulations. The

Interim Report of the Regulation Reference recommended such a requirement, and this recommendation was implicitly endorsed in the final report.¹⁴

The more modest of the arguments made in favour of the use of cost-benefit analysis are, on initial consideration, difficult to dispute. It is maintained that the purpose of cost-benefit analysis is "(i) to make the major costs and benefits explicit so that the decision-maker makes the trade-offs consciously and with the prospect of being held accountable, and (ii) to encourage the move toward a more consistent set of standards."¹⁵ On closer inspection, however, even this relatively modest conception of the role of cost-benefit analysis begins to lose its cogency.

Indeed, the pros and cons of cost-benefit analysis itself have been debated with more passion, and in some cases with as much rigour, as its practitioners bring to the weighing of costs and benefits of particular policies. Cost-benefit analysis has variously been attacked as likely to be:

- (i) erroneous, because of its sensitivity to a variety of more or less arbitrary assumptions;
- (ii) biased, because it favours consideration of quantifiable as opposed to non-quantifiable factors, and because its rather esoteric methodology establishes terms of debate which tend to restrict participation in that debate to those who can avail themselves of the necessary technical expertise;
- (iii) politically irrelevant, because it requires political decision-makers to act in ways which are inconsistent with their political interests and their accustomed style of decision-making;
- (iv) politically strategic, because it can enable opponents of a policy to delay its development and implementation, or because it can be manipulated to generate a result consistent with particular political interests;
- (v) ethically repugnant because it subjects special values, such as that inherent in human life, to a utilitarian calculus.

In assessing the alleged advantages and disadvantages of cost-benefit analysis it will be useful to review briefly its principal technical components: the selection of a criterion of choice; the identification and valuation of relevant costs and benefits; and the estimation of the levels of probable occurrence of these outcomes on the basis of available data and mathematical modelling techniques. With regard to each of these components, it is important to keep in mind that there is in fact neither standard doctrine nor standard practice for cost-benefit analysis -- although disagreements at the doctrinal level are less substantial than are divergences among actual practices and between practice and doctrine. As one analyst has put it: "the principles and practices employed are chronically controversial and under revision. This is why it is so difficult to say what benefit-cost analysis is -- there is no standard practice."¹⁶

1. The Criterion of Choice

The least stringent criterion is one of "cost-effectiveness" (indeed, many theoreticians would distinguish cost-effectiveness analysis from cost-benefit analysis entirely). Roughly this criterion translates, "choose that alternative which achieves a given objective for least cost," or "choose that alternative which achieves maximum benefit for a given cost." Problems of estimating costs and benefits, shortly to be discussed, are not avoided through the use of this criterion: what is avoided is the need to measure costs and benefits according to a common metric. One simply compares the costs or the benefits of alternative options as the case may be. If the objective (the set of benefits) to be achieved is given, or if the budget for a discrete programme has been appropriated, such a criterion may well be relevant. As Stokey and Zeckhauser have noted:

...because benefits and costs are measured in different units, cost effectiveness analysis provides no direct guidance when we are unsure whether the total benefit from an undertaking justifies the total cost, or when we are trying to select the optimal budget level for a project. But if we know what we have to achieve, or what we are allowed to spend, it is an appropriate criterion that reduces the complexity of choice.¹⁷

As an aid to the selection of an optimal level of exposure to a hazardous substance, then, the cost-effectiveness criterion is of limited usefulness. It can be invoked only once an "acceptable level of risk," or conversely an overall limit on expenditure (both public and private) on risk reduction has been decided upon. Once an acceptable level of risk has been determined, cost-effectiveness makes sense as a means of discriminating among types of standards and sanctions to be employed in meeting those exposure limits. And although the setting of an overall "regulatory budget" is still only a gleam in the eye of regulatory reformers,¹⁸ it could if employed provide the context for an assessment of the various benefit packages which could be purchased on that budget.

Even by making such prior decisions on levels of risk or regulatory budgets, it is difficult to hold costs and benefits sufficiently constant to employ a cost-effectiveness criterion. It is rarely the case that identical packages of benefits can be achieved at different levels of expenditure. As for a regulatory budget, it is doubtful that it would be drawn up on a hazard-by-hazard basis. It is more likely that under a regulatory budget it would be necessary to allocate resources among the various components of a risk reduction programme relating to a variety of hazards, in effect selecting optimal levels for 'sub budgets' within the fixed amount. In such cases, an extension of cost effectiveness analysis

may be appropriate, with benefits achievable at varying levels of cost arrayed for consideration and judgement. When at least the cost of alternative policies or policy components can be measured according to a common metric this approach can be an aid to choice, but the complexity of valuing alternative packages of benefits is not removed.

The limited applicability of cost-effectiveness analysis enhances the attractiveness of a much more ambitious criterion: the maximization of net social benefit, the hallmark of cost-benefit analysis. One of the major implications of this criterion is to establish a threshold of acceptability: a policy should be adopted only if its social benefits at least equal its social costs. We discussed the general problems of applying welfare maximization criteria to the choice of public policies regarding health hazards in an earlier section; here we expand that earlier discussion somewhat regarding the more specific issue of applying cost-benefit analysis to the setting of control standards.

The "maximum net benefit" criterion has a number of implications. Crucially, it requires that the benefits and costs be measured in common units. Beyond that, its technical implications vary according to the problem at hand. In the typical case of regulatory policy in the environmental or occupational health field, the problem is to choose among standards involving various levels of risk reduction and requiring various levels of public and private investment. If, as is usually the case, what is at issue is the level at which to set maximum permissible exposure to a particular hazardous substance, the criterion dictates choosing the level at which the marginal benefit of any further reduction would be less than the marginal cost of that reduction -- unless, of course, one first bumps against some resource constraint. (In practice, it should be noted, cost-benefit analysts may recommend the adoption of a standard because its total net social benefit is positive, without looking at what

is going on at the margin -- at whether the marginal benefit of a further reduction of the standard would exceed its cost, or conversely whether the standard has been set at a point at which its marginal net benefits are already negative.)

If, as is rarely the case in practice but could conceivably be the case under a "regulatory budget," the problem is to consider the reduction of risk for a number of hazards simultaneously, and to choose that combination of exposure levels which maximize net social benefit subject to some constraint on resources, the analysis becomes considerably more complex. The "maximum net social benefit" criterion then implies that exposure levels be established for each substance such that the marginal costs of a unit of benefit are equal.

Under a limited number of conditions (such as those which might prevail under a regulatory budget) it may be more appropriate, and simpler, to use a criterion based on incremental benefit-cost ratios. Where a total resource budget establishing a constraint on only one type of resource (such as public and private monetary investment) is to be allocated among a number of independent policy options, it is possible mathematically to derive an incremental benefit-cost ratio (that is, the rate at which benefits increase with increases in costs) which functions as a cut-off point. In order to achieve an optimal allocation of the constrained resource, policy options ought to be pursued as long as, and only as long as, their incremental benefit-cost ratios exceed the cut-off ratio.¹⁹ It will be noted that the analyst must take care to define costs only in terms of the constrained resource -- other "costs" should be expressed as negative benefits.

The simplicity of this criterion is compelling, so compelling that its technical limitations are often ignored. In practice, alternative policy options are often compared on the basis of their total, rather than incremental, benefit-cost ratios. Furthermore, ratios, either incremental or total, may be used rather arbitrarily where resource constraints are not a direct consideration. And they may be used without sufficient appreciation of their sensitivity to the inclusion of negative outcomes in the numerator (as negative benefits) as opposed to the denominator (as positive costs).²⁰ There is hence considerable potential for the abuse of benefit-cost ratios in determining optimal exposure limits with respect to health hazards, although it is conceivable that they could be useful, carefully employed, in determining such limits in the context of a regulatory budget constraining public and private investment in health protection.

Parenthetically, it is interesting to note that the recent U.S. Executive Order noted earlier appears to envisage the use of all of the criteria of choice just reviewed. In a recent interview, James C. Miller III, Administrator of Information and Regulatory Affairs for the Office of Management and Budget, stated that the Order is intended to require that regulations be "cost-benefit justified, cost-effective, and designed to maximize net benefit to society."²¹ It remains to be seen whether the federal agencies covered by the Order and the OMB discriminate among the criteria in terms of their applicability to different choice situations.

2. The Identification of Costs and Benefits

To a considerable extent the definition of costs and benefits may be affected by the criterion of choice. Both a "maximum net benefit" criterion and a benefit-cost ratio require that costs and benefits be measured in the same units; a cost-effectiveness criterion does not. A benefit-cost

ratio is sensitive to the definition of negative outcomes as either "negative benefits" or "costs"; a maximum net benefit criterion is not. For the purposes of this section, let us consider the positive outcomes to be "benefits," and the negative outcomes to be "costs," although we recognize that this usage will vary in practice. We will be concerned here with the identification of the factors to be considered in the valuation of outcomes, leaving aside for the moment the difficulties of predicting outcomes.

The marginal negative outcomes or costs of lowering a standard of maximum permissible exposure include losses which accrue from foregone alternative uses of the public and private resources which must be invested in meeting and enforcing this standard as well as any negative side effects of the technology developed to meet the standard. The definition of the first of these categories of cost, the opportunity costs of the standard, has important implications for the calculation of the present value of future streams of investment in maintaining the standard. In principle, the appropriate discount rate over the life of the policy is the weighted average of the rates of return for all the foregone uses of the resources involved -- the weights being the proportion of the resources which would have been devoted to each alternative use. Unfortunately, it may be exceedingly difficult to specify the foregone alternative uses of the resources involved in meeting and enforcing standards. Public resources might otherwise be devoted to other public purposes, or they might be released to the private sector, where they might be either invested or consumed. The private sector resources invested in meeting standards might otherwise be devoted to expanded production, technological innovation, diversification, or some combination thereof. If one assumes an economy operating at less than full

employment and full capacity, indeed, a proportion of the public and private resources involved might otherwise be idle, and the opportunity costs will therefore be reduced.

The determination of the appropriate average rate at which to discount future streams of investment in a given policy is usually one of the most hotly contested issues among practitioners of cost-benefit analysis. And small wonder: not only is the choice heavily one of judgement and "guesstimate" regarding alternative uses of resources in future states of the economy, but furthermore, as we shall see, its implications are not distributively neutral. Finally, because of their compounding effects, even small differences in discount rates can have substantial effects on cost and benefit estimates.

As for the second type of cost, the negative side effect, the major point to be made is that such costs are very difficult to determine in advance, although in hindsight it is often asserted that the analyst ought to have anticipated such factors. In a case relevant to the present discussion, the U.S. Environmental Protection Agency's initial cost-benefit analysis of the mandating of catalytic converters has been criticized for including the positive impact of reduction in carbon monoxide and hydro-carbon emissions, while ignoring the increased emissions of sulphates as a negative side effect of the technology.²² Where these negative impacts affect health, they involve problems of valuation (including discounting) even more substantial than those so far discussed. The problems of valuing health outcomes more commonly arise, however, in the treatment of the benefits of standard-setting programmes, and we now turn to that discussion.

The negative outcomes of benefits of a standard reducing exposure to health hazards include those attributable to the marginal improvement of the health status of exposed individuals as well as any positive side effects of the technology developed to meet the standard. The problems of identifying the factors to take into account in estimating the present value of such benefits dwarf those that we have just addressed in our discussion of costs. A voluminous literature attests to, but does little to resolve, the difficulties of evaluating intangible benefits, particularly those relating to the preservation of life and to physical and emotional well-being.²³ It is difficult to know even what factors to take into account, let alone how these factors are to be expressed in units common to those used to measure the resources which must be invested in their enhancement.

The marginal health benefits of a current reduction in exposure to a health hazard such as asbestos, given the long latency period of asbestos-related diseases, will be experienced as a reduction in the incidence of debilitating and fatal diseases some ten to twenty years in the future. What is the present value of a year of life, or a year of life free from asbestos-related disease, twenty years hence? Any valuation should presumably take into account the interests of the individual whose life is involved, his family and friends, and society at large. It should also, in theory, consider "elasticities of demand for the good 'reduction of the risk to life'" -- according to age, for example, or income.²⁴

One fairly common practice is to assess the present value of the prevention of the future occurrence of a disabling or fatal disease as the present value of the earnings which would be foregone by the afflicted individual plus the medical expenses which would be incurred were the disease to occur. (It should be noted that these medical

expenses can be saved by dying as well as by surviving without illness, and hence this measure assigns a higher value to the prevention of disabling as opposed to swiftly fatal disease.) A somewhat broader concept includes as well rather arbitrary measures of the value to the individual of leisure time, including retirement years.²⁵ The choice of appropriate discount rates for these future values is very much a matter of contention. In principle, since the costs and benefits of administered standards are not likely to be substantially co-incident (unless one assumes in the occupational health arena that most costs will be passed back to employees), different discount rates should be applied to cost and benefit streams. In practice, health-related outcomes are either not discounted at all, or are discounted at the going rate for monetary investment. And indeed, once one is willing to tie the valuation of a period of healthy life to the rate at which the labour represented by that period of life can be traded on the market, the discounting of such values at going rates strains credulity only slightly further.

It should be noted, however, that the values at which discount rates are set introduce systematic biases into the analysis -- biases which are particularly significant with respect to the cost-benefit analysis of exposure standards. Where the benefit of a programme only begins to occur several years into the future, and costs involve a sizeable initial capital outlay plus yearly operating costs, a high discount rate will result in a substantially lower estimate of the present marginal net benefit of a tightening of standards than will a lower discount rate.

Finally, of course, none of these earnings-based measures takes into account intangible factors such as anxiety, pain, anguish, and bereavement.

Some analysts seek, sensibly, to avoid these various problems by defining the present value of future years of healthy life in terms of what individuals are willing to accept to incur risks of future illness -- such as 'risk premiums' paid in the form of higher wages for risky jobs. As

was evident in our earlier discussion in Chapter 3, however, there are severe problems in using observed risk premiums as measures of the value of future years of healthy life. Notably, in the real world individuals make decisions about accepting these premiums in the context of very imperfect markets characterized by information gaps and mobility constraints. Furthermore, those individuals who choose to accept particular risks may well be atypical of the broader class of individuals who might be exposed to those risks; again we refer to Zeckhauser's point that those whom we observe accepting risks are likely to be those who for one reason or another value the risks least in relation to the benefits they receive for assuming them.²⁶

Willingness-to-pay measures are sometimes criticized as capturing at best only the valuations that an individual himself (and perhaps his family) places on the value of reduction of risk to his life. Other measures attempt to get at the value of that risk reduction to the remainder of society, by assessing the individual's discounted net contribution to society (taxes minus consumption of social security benefits, for example). Such measures are greatly weakened by their severely limited scope and their failure to take into account the preferences of society not to see its members suffer and die (let alone the problems of discounting tangible and intangible outcomes discussed earlier). At best, they should be considered complementary to measures of individual willingness to pay.²⁷

A somewhat related criticism of individual willingness-to-pay measures is that they attempt inappropriately to extrapolate from private to public valuations. Steven Kelman has presented this essentially technical criticism²⁸ in ethical language:

Precisely because we fail, for whatever reasons, to give life saving the value in everyday personal decisions that we in some general terms believe we should give it, we may wish our social decisions to provide us the occasion to display the reverence for life that we espouse but do not always show.²⁹

One response to this criticism is to look for measures of society's willingness to pay for risk reduction in a given situation by observing its "revealed preferences" in analogous situations. But these social decisions are taken in the context of limited information and are constrained by political configurations particular to specific hazards; and the following of "revealed preferences" may simply mean that the blind and the halt in one area lead the blind and the halt in another.

There is one area, however, in which benefits may be relatively easy to value in units common to those used to measure resources invested. Exposure control technology may lead to innovations allowing previously dissipated resources to be captured and reused, as in the cases of poly-vinyl chloride and perchloroethylene.³⁰ The problem in such cases is not one of valuation but of prediction, and depends on the state of development of, and experience with, the relevant control technology.

In general, given the seemingly intractable difficulties of valuing life in units which are common to those used to measure other benefits or costs of a policy, some analysts would abandon the quest and seek at best to perform a cost-effectiveness analysis of the number of lives or years of life which can be saved at various levels of cost -- in the present context, the number of lives or years of life saved with more or less costly exposure standards. This approach may well be the only feasible one as long as standards are adopted on a hazard-by-hazard basis. A higher or lower level of exposure to a given hazard increases or decreases total

risk to life; it does not re-distribute risk from one life to another, and one can simply assume that adding to the pool of years of life saved is better than subtracting from it. If one is considering the cost-effectiveness of investing in setting standards relating to different hazards, however, different lives are involved. Unless one is prepared to assume that "a year of life is a year of life" to whomever it accrues at whatever point in a lifespan, one is left again with the problem of valuing these lives according to a metric which allows them at least to be compared to each other.

This latter point touches upon the fundamental weaknesses of cost-benefit and cost-effectiveness analyses in dealing with distributional issues -- weaknesses which we have postponed addressing. After one slight further postponement, to consider briefly some technical issues of data assembly and analysis, we shall address some of these distributional issues in the context of a general critique of cost-benefit analysis.

3. Data Assembly and Analysis

Identifying and valuing the relevant types of positive and negative outcomes of the adoption or modification of control standards is of little practical purpose in cost-benefit analysis unless the likely levels of occurrence of the outcomes can be predicted. Such prediction involves specifying a more or less sophisticated model, estimating the parameters of that model on the basis of available data, and simulating the effects of proposed policy changes. In other words, it is necessary to identify the various factors which are likely to influence the outcomes of interest, to investigate the extent to which these factors in combination have affected the relevant outcome variables in the past, and on that basis to predict the effects of changes in those factors -- changes introduced through standard-setting policy as well as changes expected to occur in factors outside the scope of policy.

There are a number of points at which this process may go wrong. Relevant factors may be omitted in the specification of the model. The parameters of the model may be wrongly estimated because of problems with the format or the accuracy of available data. (We have noted the difficulty of estimating one parameter -- the effect of exposure levels on disease incidence -- when data are clustered in high dose regions.) Wrong assumptions may be made about the stability of the parameters over time, particularly if they are sensitive to the effects of omitted variables. (Mortality rates, to take one of the starkest examples, may be profoundly affected by changes in therapeutic technology.) Future changes in the levels of the factors outside the scope of the regulatory policy (such as corporate tax rates) may be wrongly projected.

Recognizing the possibility of such errors of assumption and technique, analysts often seek to test the sensitivity of their results to changes in model specification, parameter estimation, and projected values. Where results are fairly robust with respect to such changes, they can be more confidently accepted. Unfortunately, models relating to health hazards deal in very low probability ranges, in which changes of a fraction of one percent in estimated probabilities can have substantial effects on estimated outcomes. This is particularly the case where large values are involved, or where several low probability parameters have compound effects. To take a simplified example, if a unit increase in an exposure level is estimated to carry a two percent excess risk of a disease with a fifty percent mortality rate, and the exposed population is one-hundred thousand, the predicted number of deaths as a result of such an increase would be $.02 \times .5 \times 100,000 = 1,000$. If the excess risk were to be estimated to be 1.5 percent and the mortality rate to be thirty percent, however, the predicted number of deaths would be $.015 \times .3 \times 100,000 = 450$. This difference is likely to be even greater once the valuation of those lives is taken into account.³¹

The prediction of outcomes on the basis of model specification and estimation is subject not only to error but to bias. The technical assumptions of the mathematical and statistical methods involved and the nature of available data may exacerbate difficulties and reinforce biases which characterize the optimizing and discounting techniques discussed in the previous section.

Most notable is the bias in favour of tangible, mathematically precise measures. This bias is introduced into the valuation process through the application of discount rates and more significantly through the various optimizing techniques -- such as linear programming or the calculus of constrained maximization -- used to select among alternative policies on the basis of net benefit or benefit-cost ratios. The use of such techniques requires that the value of positive and negative outcomes be measured on a ratio scale (a scale with equal intervals and a zero point). Hence levels of bereavement, for example, if they were to be included in the analysis, would have to be expressed on a scale such that two widows could be said in a real sense to suffer twice as much as one. Techniques of prediction are similarly limited in their ability to handle non-ratio scale data. The usual and most powerful statistical techniques of prediction, such as regression analysis, are those which express estimated outcomes on a ratio scale, and generally require that the variables used as predictors be measured on ratio (or at least interval) scales as well, although 'dummy' (yes-no; acceptable-unacceptable) measures may be included.

Even where the relevant data can be expressed without distortion in ratio-scale terms, they may be otherwise distorted or inaccurate. Standard-setters are typically heavily dependent upon the regulated industry for data regarding likely capital and operating costs of compliance, the

production function and likely alternative resource uses. The accuracy of industrial responses to such data requests is likely to be reduced by real uncertainty (especially as to alternate uses), and by a clear incentive for industrial interests to bias upwards their estimation of compliance costs.

The estimation of benefits is similarly hobbled by data problems. The lack of firm scientific evidence upon which to estimate the parameters of a predictive model has been treated at some length in Chapter 2. Furthermore, data regarding the age structure, years of exposure, and health status and habits of the exposed population -- all of which are ideally to be incorporated in a model predicting the effect of changes in exposure levels -- is rarely available. The logical sources of such information, unions and labour ministries, have lacked either the will or the resources to assemble it.

D. Decision Rules: A Critique

With the possible exception of the best available technology principle, the decision rules discussed in the preceding section are outside the realm of science, although as long as scientific evidence is brought to bear in their application they are not inconsistent with scientific principles. Controversy about the selection of the appropriate decision rules rather derives from economic, ethical, and political perspectives.

Economically, the weight of the approval is clearly with the explicit weighing of costs and benefits and the application of a cost-effectiveness, maximum net benefit, or benefit-cost ratio criterion. Fundamental economic concepts of welfare maximization or at least of technical efficiency underlie these prescriptions, and economic debate largely focuses on the application of particular criteria and techniques in given situations. The zero-risk principle violates the most fundamental of economic principles by deeming opportunity costs irrelevant. Indeed, Murray Weidenbaum, Chairman of the U.S. Council of Economic Advisers, has

identified the principle as the first target of attack in a review of federal regulatory enabling legislation, having stated that "any statute that embodies or is thought to embody the zero-risk concept cries out for Congressional review."³² The "best available technology principle," to the extent that it smuggles in benefit-cost considerations, is more acceptable from an economic perspective, although there is considerable debate as to whether in practice it inhibits or fosters technological development and diffusion. Furthermore, it seems reasonable to argue from an economic perspective that if the best available technology principle is acceptable because it implies benefit-cost considerations, it is even more preferable to bring these considerations fully to light, while treating technological resources as a constraint.

The major economic reservation regarding explicit benefit-cost analysis related not to its principles but to its feasibility, given pervasive uncertainties and imperfect measurement instruments. But this reservation itself often leads to a prescription for more rather than less cost-benefit analysis -- that is, for staged cost-benefit analysis as the effect of incremental policy changes becomes apparent. Furthermore, the undertaking of the analysis itself may be subjected to cost-benefit considerations. It is usually argued that analysis ought to be undertaken only to the extent that the additional information it will generate at any point in time is at least equal in benefit to its marginal cost.

The primary criticisms of explicit analysis of costs and benefits are ethical and political in origin. Let us first consider the ethical critique. One set of ethical objections has to do with the distributive implications of cost-benefit analysis. As we noted in Chapter 5, it is entirely consistent with, if not dictated by, ethical prescriptions to set out clearly the incidence of the costs and benefits of a policy -- to

identify the winners and losers and the extent of their wins and losses. But costs and benefits tend to mask these distributive implications; to be insensitive to the fact that a change which increases net social benefit may leave a particular segment of society much worse off. Furthermore, certain of the techniques of cost-benefit analysis tend not only to mask but to bias distributive outcomes. Valuing lives in terms of foregone earnings, to take the most egregious example, clearly places a higher value on the lives of high income than low income earners. Valuing a reduction in the incidence of disease in terms of medical expenses saved places a higher value upon the prevention of chronic disabling, as opposed to swiftly fatal, disease. High discount rates lead to a preference for immediate benefits and deferred costs and hence discriminate against the interests of the young and of future generations.

Cost-benefit analysis can be made explicitly to address distributive issues, although it cannot resolve them. Net benefits can be calculated for groups within society as well as for society as a whole, and the results arrayed for judgement. In such cases, cost-benefit analysis may clarify the options but it cannot provide the criterion of choice.

In a related way, cost-benefit analysis is criticized for discriminating against the consideration of intangible values. The expression of these values in terms of the ratio-scales or dummy measures necessary to incorporate them in mathematical models may well be so arbitrary as to be ludicrous; and the analyst may deem it preferable to omit them from the formal process of predicting and valuing outcomes entirely. The analyst may still, of course, flag intangible costs and

benefits for consideration alongside the prescriptions of the formal analysis, but cost-benefit criteria provide no guidance for their inclusion in the final judgement.

More fundamental than the objection that certain values cannot be incorporated (at least not without great strain) in a cost-benefit analysis is the objection that certain values ought not to be subject to a cost-benefit criterion. This argument has been forcibly put in a recent article by Steven Kelman.³³ Judgement ought to be made, this argument goes, on the basis of a consideration not only of the overall balance of the positive and negative outcomes of a choice, but also of certain rights and duties. There is a 'right' to, or at least a 'special value' in, life which cannot be outweighed in a utilitarian calculus involving market-traded values, but must rather be reconciled with competing values and rights in a process of moral judgement. The value of life exists in a special category, such that the very process of attempting to estimate its equivalent market value reduces its non-market value. Colloquially, it is argued that 'putting a price tag' on life reduces its perceived but immeasurable value.

It matters, that is, not only what we choose but how we choose. To the argument that people do "in effect" trade off costs and benefits all the time by making decisions which impose risks on themselves or on others in exchange for certain benefits, these critics would reply that the focus on effects begs the central question of the process of decision. It is the process of deliberate judgement, of the weighing of conflicting rights and duties and other values against each other, which marks us as moral creatures. To assign ex ante values to certain outcomes and then to let arithmetical calculation do the rest of the job is to abdicate our moral responsibility. In this view, it is possible

to speak of the 'right' to a safe workplace which must be reconciled with the danger of requiring such a high level of safety that the workplace itself disappears -- and OSHA's interpretation of its enabling legislation, discussed above, makes good moral sense.

Economic responses to this ethical critique (other than those which simply assert the rationality of making "in effect" calculations explicit) have, interestingly enough, generally focused on its political rather than its economic weaknesses. If moral judgement is to involve a process of the deliberate reconciliation of rights and duties and other conflicting values, only some of which are traded on markets, whose judgement is determinative? For that matter, who decides which values are to be entrenched as rights and duties?

On one line of reasoning, the "deliberate reconciliation" of rights and duties and other "special values" is likely to degenerate into a politics of polarization, confrontation, and "holy wars." Although it caricatures the ethical position to which it is opposed, the following argument is illustrative;

People specially value many different things. Under Kelman's assumptions, people must, in creating a political coalition, recognize and accept as legitimate everyone's special value, without concern for cost. Any coalition built on such premises can go in either of two directions; it can try to incorporate so many different groups and interests that the absurdity of its internal contradictions becomes manifest. Or it can limit its membership at some point and decide that the special values of those left outside are not legitimate and should be sacrificed to the special values of those in the coalition. In the latter case, of course, those outside must be made scapegoats for any frustration of any group member's entitlement, a requirement that eventually leads to political polarization and a holy war between competing coalitions of special values.³⁴

This argument assumes a high degree of political mobilization among the interests affected by regulatory policy. More plausible in many cases is a critique which takes into account the broad areas of discretion and the continual process of bargaining which characterize most regulatory decision-making. The following response to Kelman's article, by several staff economists of the U.S. Federal Trade Commission, is an example:

Kelman's proposal is to adopt an ethical system that balances conflicts between certain unspecified "duties" and "rights" according to "deliberate reflection." But who is to do the reflecting, and on whose behalf? His guide places no clear limits on the actions of regulatory agencies. Rather than enhancing the connections between individual values and state decisions, such a vague guideline threatens to sever them. Is there a common moral standard that every regulator will magically and independently arrive at through "deliberate reflection?" We doubt it. Far more likely is a system in which bureaucratic decisions reflect the preferences, not of the citizens, but of those in a particular position to influence decisions. What concessions to special interests cannot be disguised by claiming that it is degrading to make explicit the trade-offs reflected in the decision? What individual crusade cannot be rationalized by an appeal to "public values" that "rise above" values revealed by individual choices?³⁵

Clearly, if the process of choosing among regulatory options is to be one of deliberate judgement, at best informed by, but not restricted to, cost-benefit calculations, it matters very much whose judgement is brought to bear on the choice, and we are into the realm of politics. Let us, then, consider more fully the political implications of the decision rules which we have been discussing -- the zero-risk, best available technology, and cost-benefit principles, as well as Kelman's deliberate reconciliation.

The zero-risk principle has a certain face attractiveness as a political position. It accords with what Zeckhauser terms the social "myth" (as opposed to the ethical axiom) that life is priceless.³⁶ Furthermore, it

promises to provide a political decision-maker with a clear and simple cue: it delegates to scientists the investigation of the question of the existence of risk and asks only for a yes-no response. The repertoire of policy response to that cue is almost as simple: risk is to be eliminated through bans or technological shields. As argued above, however, the principle becomes unwieldy in practice. It does not avoid the need for judging costs and benefits, since the dynamics of the political process force those judgements upon policy-makers; but it limits the flexibility of the policy response.

The political merits and demerits of the best available technology principle are somewhat different. The symbolic value of the principle is not as great: it can imply a capitulation to technology and to industrial interests. The cue it provides is not as simple, since the determination of the best available technology (or the best practical means) implies the application of at least a cost-effectiveness, if not a maximum net benefit, criterion. But the principle does, in contrast to the zero-risk principle, provide policy-makers with a wide range of discretion and flexibility in negotiating with affected interests.

Similar kinds of considerations complicate the political feasibility of explicit cost-benefit decision rules. To a considerable extent, the political problems of applying these rules stem from certain paradoxes which underlie their use. At one level, cost-benefit analysis promises to reduce large amounts of complex information to relatively simple decision cues. Ironically, then, these highly analytic techniques may be chosen because they facilitate a cybernetic approach to decision-making at the political level. They allow the political decision-maker to delegate to the analyst, to a large extent, the cognitively difficult

process of making judgements involving tradeoffs, and to respond simply to the "bottom line" of the analysis. And they appeal, symbolically, to another social myth, the myth that government ought to operate efficiently.

The naïveté of this impression of the political role of cost-benefit analysis soon becomes apparent in practice. Cybernetic decision-makers are unlikely ultimately to embrace such analysis despite its 'cueing' function, since it accords poorly with the more usual cybernetic strategies of attending to familiar sources, making tentative probes of the environment, and responding to feedback with incremental change. Even for those who take a more analytic approach to political decision-making, an analysis of the positive and negative social impacts of a policy will not necessarily reveal the political costs and benefits of adopting that policy. The political calculus requires an understanding of the distributive implications of the policy and of the significance of various constituencies of affected interests to an effective coalition of support for the policy and the policy-maker. The balance of social costs and benefits of a policy is irrelevant if it generates sufficient political opposition to defeat itself or its sponsor. From a political perspective, a consideration of the costs of buying off vetoes needs to be overlaid on the analysis. And the more complex these analyses of the social, distributive, and political impacts of the policy become, the more likely it is that political decision-makers will resort to responding to relatively simple cues of approval or disapproval from their traditional constituencies of support and, if necessary, from potential supporters.

The naïve understanding of the political role of cost-benefit analysis suffers from another weakness noted earlier in Chapter 4. It assumes that negotiation imposes costs on political decision-makers.

Accordingly it assumes that they will seek to avoid negotiation either by appealing to formal analysis or by delegating negotiation to others, as long as the outcome of the analysis or the delegated negotiation is supported by an effective coalition of support. But negotiating and bargaining form part of the very stuff of politics, and a large part of its attraction for many political decision-makers. The process of "making the deal" is as exhilarating for some politicians as it is for their private sector counterparts. Granted it is necessary to delegate much decision-making to analysts or bureaucratic negotiators in the face of high information costs, or changing implementation conditions, or a preference for a low political visibility for the making of tradeoffs -- all of which features characterize the regulation of health hazards. But it should not be assumed that politicians seek to minimize their own participation in negotiations as costly; rather they may seek a level of participation which yields them, in a rough sense, the maximum net benefit from the process. The "benefit," the pleasure derived from that participation, varies greatly, of course, across individual decision-makers. The point here is simply that negotiations may be a more politically attractive means of making tradeoffs than is analysis, and that even where an initial political commitment to formal cost-benefit analysis has been made, it is likely to dissolve in favour of a negotiated outcome.

This understanding may help to explain why cost-benefit analysis is more popular in the bureaucratic than in the legislative arena. Those drawn to bureaucratic careers may be less inclined by profession and temperament to derive enjoyment from the negotiation process. Moreover,

the bureaucracy is increasingly inundated with delegated issues for which elected officials have had neither the information, the time, nor the will to negotiate a resolution. In such a situation, bureaucratic decision-makers may well seek themselves to delegate the making of tradeoffs to cost benefit analysts and to limit their own role to a response to the relatively simple cues of cost-effectiveness and maximum net benefit measures.

Those decision-makers, elected or appointed, who seek such simple cues however are inevitably frustrated. What stands out most strongly from our review of the techniques of cost-benefit analysis is the sensitivity of the analysis to assumptions made therein: regarding the definition of factors to be considered as costs and benefits, regarding discount rates, regarding methods of valuing life, regarding the specification of predictive models, regarding mathematical modelling techniques. At almost every stage, cost-benefit analysis is capable of extracting information from ratio-scale data, but loses much information which does not initially present itself in those terms and must be "translated." This information bias is no less strong for deriving from analytic capabilities rather than cognitive predilections. Beyond this technical bias, moreover, the methods of cost benefit analysis are highly manipulable. Mendeloff reports a study in which 72 estimates of the net benefit of OSHA's two fibre per cc standard for asbestos were computed, using the various possible combinations of three assumptions about the number of asbestos-caused deaths, three assumptions about the trend of benefits and costs over time, two time periods of varying lengths, two discount rates and two measures of benefits.³⁷ The resultant benefit-cost ratios ranged from 0.07 to 27.70. Widely varying compliance cost

estimates are common in the environmental and occupational health fields, as they are elsewhere. OSHA estimates the costs of compliance with its cotton dust standard, for example, at \$650 million, while the industry estimate is \$2.7 billion.³⁸ Gil Reschenthaler notes that in the case of OSHA's 1974 vinyl chloride standard, the industry estimates of compliance costs were 200 times those actually incurred.³⁹

As in the case of conflicting scientific evidence (which often contributes in part to conflicting cost-benefit analyses), discrepancies in the results of cost-benefit analyses are usually biased in favour of the political and economic interests of their sponsors, and are fast eroding the political credibility of the approach. Cost-benefit analysis is viewed increasingly as a political as much as an analytic tool. Although the assumptions which lead to widely differing estimates are laid out in the context of rival analyses (a point which is emphasized by proponents of the technique who applaud its ability to reveal assumptions and "smoke out ideologies"),⁴⁰ debate over those technical assumptions tends to exclude all but the initiate. The policy process is increasingly characterized by what Lindblom some years ago termed "partisan analysis."⁴¹ In the simpler words of a former OSHA head, "You can make your study; I can make my study. Nobody really knows."⁴²

Not only may cost-benefit analyses be used to support a particular political position, they may be used to delay action on a policy. Cost-benefit analyses are time consuming and costly. Requiring standard-setting agencies to undertake such analyses may reduce the number of hazards which the agency can address and delay the action which it can take on any one. And it must be noted that delaying agency action may

not simply defer the costs to the regulated industry, but may also substantially reduce them. Delay may provide time for the coalition of support for a standard to unravel, or for the issue to move to a point in the 'issue attention cycle',⁴³ at which costs of control are more heavily weighted or concern with risks has abated.

If cost-benefit analysis is susceptible to political manipulation, and if political considerations are likely to dominate anyway, it seems to make little sense to mandate such analysis -- unless one is seeking a mechanism, with some face validity, for hamstringing the regulatory agency. It also seems unlikely, on the other hand, that cost benefit analysis can be avoided. It is to the advantage of the industrial interests which at least in the first instance bear the costs of compliance to introduce cost-benefit considerations. Not only do such interests have ready access to the information and the economic expertise necessary to conduct such analyses, but they can also delay action by engaging the regulators in a cost-benefit debate. In response, regulators and prospective beneficiaries of the standard may be driven to performing or commissioning countervailing analyses or appealing to rights, duties, and other values.

Some would maintain, indeed, that this process of partisan analysis and value reconciliation through political interaction is the most intelligent which can be expected in the public policy arena. It draws upon both the analytic and the cybernetic capabilities of the political system -- and by so doing ensures that the widest range of values is brought to bear upon policy choice, and that, to some extent, bias counteracts bias in the interpretation of relevant information. This

is Lindblom's now familiar thesis of the "intelligence of democracy" -- a thesis captured in the inimitable prose of one of Lindblom's most faithful disciples, Aaron Wildavsky, as follows:

... the truth (which analysts) have to tell is not necessarily in them, nor in their clients, but in what these cerebral prestidigitators often profess most to despise, their give and take with others whose consent they require, not once and for all, as if the social contract were forever irrevocable, but over and over again. This policy process is certainly exhausting, hardly exhilarating, but hopefully enlightening.⁴⁴

This process of 'give and take' not only allows for a reconciliation of competing preferences, but it also allows for the preferences themselves to be shaped. Much of the political complexity and uncertainty of the health hazard arena stems from the generality, amorphousness, and ambiguity of the preferences of significant constituencies -- notably organized and unorganized labour, and widely spread but increasingly mobilized third-party and consumer interests. Any decision-making process which relies upon an ex ante knowledge of preferences in this context is unlikely to produce results which satisfy sufficient political demand to maintain a coalition of support. It is much more likely that preferences will be shaped and coalitions forged in the process of considering concrete options.

Politics, then, like ethics, focuses our attention on the process of decision-making. The political concern with reconciling the preferences of strategic constituencies is not identical to (and may be in some tension with) the ethical concern with deliberate reconciliation of values. But there is this similarity: the weighing of values in the health hazard

arena, like the adjustment of preferences, is likely to occur in an interactive process of developing concrete courses of action. In a similar vein, but from a jurisprudential point of view, Lon Fuller has described social decision-making processes as involving "not...disembodied 'values' but...human purposes actively, if often tacitly, held and given intelligent direction at critical junctures."⁴⁵

The central 'decision rules' in the health hazard arena relate not to criteria of choice but to participation in the process of choosing. Who is to identify the rights and duties at stake and the relevant positive and negative outcomes to be considered? Whose 'partisan analyses' are to be developed and considered? Whose deliberate judgement is to be brought to bear? What, in short, is the appropriate institutional framework, the structure of relationships among decision-makers and affected interests?

III. The Institutional Framework

Standard-setting programmes typically involve the exercise of broad discretion by administrative officials. This phenomenon is not surprising; it derives from the factors which lead political decision-makers to adopt

such instruments in the first place. Under the symbolic umbrella of the programme, standard-setters must be free to bargain, on the one hand, with those whose compliance is necessary, and who can drive up the enforcement costs of a set of standards, even to the point of an effective veto. On the other hand, standard-setters must maintain the support of the immediate beneficiaries of the programme, lest they become sufficiently dissatisfied to "blow the whistle" to alert a broad and diffuse constituency of concern.

To a large extent, the institutional design of a standard-setting process will be shaped by those political imperatives, and the outcome of the process will be heavily influenced by the balance of political forces. But the design can in turn channel those political forces, by affecting the distribution of two key political resources: access to information and access to the centre of decision-making.

Canadian standard-setting processes in the health hazard arena have not made such access widely available. Typically, occupational and environmental health standards have taken the form of administrative guidelines or Cabinet regulations under enabling legislation in which criteria are stated in very general terms. And while guidelines and regulations have different legal effects, the process of their establishment has been similar. It has typically taken an international reference point and sought to adapt it to secure compliance in the Canadian context. Hence international standards or prevailing domestic practices are modified over time, through negotiations between regulators and the regulated industry in the course of the compliance process, and are eventually adopted as guidelines or regulations.

This strategy may make political sense in establishing a standard which can be implemented without veto and will not lead to the defeat of its political sponsor. It requires only that the standard fall within a range defined by the overlap of the classes of potential standards acceptable to the various strategic constituencies.

There are problems with this political "satisficing," however; it ignores other potential solutions which would not only be politically acceptable, but which might also come close to satisfying economic, ethical, or scientific concerns. Furthermore, as significant segments of the labour, third-party, and consumer constituencies become politically mobilized, and their concerns articulated through electoral vehicles and the media, even a "satisficing" solution may be increasingly difficult to achieve without allowing broader access to the decision-making process.

There are a number of structural and procedural options for channelling access to the decision-making process; options which are relatively well- or ill-suited to deal not only with political but with economic, ethical, and scientific complexity. In general, these options coalesce into four different models of the relations among decision-makers and affected interests: bargaining, managerial discretion, adjudication, and consultation. Before discussing each of the models, a few general points should be made. One concerns the important advantage conferred by face-to-face interactions with decision-makers. Cybernetic theorists and others have drawn attention to face-to-face interactions as highly determinative of decision-making outcomes, through the development of shared perspectives and reciprocal relationships.⁴⁶ Another significant consideration is the strategic importance of participation relatively early in the decision-making process, before the problem is fully structured and a variety of alternative solutions or political options has been foreclosed.

Finally, it is clear that face-to-face and timely participation in decision-making becomes more difficult to achieve as the number of legitimate participants increases. The greater the number of participants, the less likely it is that decisions can be shaped by face-to-face interactions. The greater the involvement of relatively unorganized or partially organized interests, the more tenuous the lines of accountability between participants and those they "represent." And the broader the scope of participation, the greater the risk that the decision-making system will be overloaded or paralyzed -- an outcome which has neither political, economical, ethical, nor scientific merit.

With this background, let us consider four models of the structure of relationships among decision-makers and affected interests. Each of these models has different implications for the range and weighting of the interests involved, the range and nature of options considered, the source, type, and format of the information adduced, and the transactions costs entailed. And each exhibits a rather different mix of analytic and cybernetic characteristics, which renders it well- or ill-suited to the conditions of complexity and uncertainty which characterize the health hazard arena.

A. Bargaining

As we have argued in Chapter 6 and throughout this paper, all policy instruments (and by extension all processes of public standard-setting) are likely to involve some elements of implicit or explicit bargaining. Nonetheless, it is worth tracing out the implications of a model based upon explicit bargaining relationships among affected interests, a model in which bargaining is essential to decision-making. In this model, the bargaining process is what produces the decision and what gives it its legitimacy; the decision is the ultimate (or at least the interim) consensus reached by affected interests.

In its pure theoretical form, bargaining is a process of reciprocal control among actors, based on their respective control of mutually valued resources, and entailing "a voluntary exchange ... which each believes will render him better off than he was before (or would be in the absence of) the exchange."⁴⁷ Practical incarnations of this model are rare in North American standard-setting systems: perhaps the closest approximation is the "offeror" procedure utilized by the Consumer Product Safety Commission in the United States. Its organic statute authorizes the CPSC to contract with an outside organization (the offeror) to develop a product safety standard through systematic negotiations with affected interests such as consumers, large and small manufacturers, retailers, etc. The CPSC, however, retains the discretion to ratify the agreed-upon standard; that is, it may accept, reject, or modify the standard developed by the offeror.

It is necessary, indeed, to step outside the North American system to a considerably different system of political culture and institutions to find a closer approximation of the bargaining model in the standard-setting process. In Sweden, to take the outstanding example, commissions representative of a variety of affected interests make binding standard-setting decisions regarding occupational and environmental health hazards. The strong corporatist aspects of Sweden political culture and institutions have rendered this bargaining process more accommodationist than adversarial. As several political commentators have noted, Canadian regulatory processes⁴⁸ also exhibit corporatist elements; but these processes have not effectively embraced labour interests, and a bargaining model could be expected to work very differently in the Canadian context. It is in that context that the model will be evaluated here.

The strengths of the bargaining model are compelling, particularly in the face of the complexities which characterize decision-making about health hazards. It does not require that a central decision-maker deal

"synoptically" with all of the interrelated variables and the multiple criteria relevant to the decision; but rather makes more limited (though still substantial) demands of human intelligence. That is, it requires of each participant the capacity to perceive the effects of a variety of solutions upon his own interests, and to have sufficient appreciation of the preferences of other participants to be able to devise a bargaining strategy.

The bargaining process, moreover, has the capacity to generate a wide range of potential solutions, as each participant makes proposals and revises them in the light of reactions from others. Furthermore, these proposals are generated by those directly affected by, and therefore with a "feel" for, the problem at hand.

The major strength of the bargaining process, however, is in the character of the relationships which it encourages. It brings affected parties face-to-face with each other (we are dealing here with an explicit bargaining model, not a model of tacit bargaining where, for example, various parties make independent submissions to an arbiter). As noted, face-to-face participation in decision-making constitutes an important political resource for each participant vis à vis non-participants and encourages log-rolling and accommodation among participants, thus increasing the likelihood of a mutually acceptable solution. And, to a greater extent than the other models to be considered, bargaining leaves decision-making power (even if not institutional authority) with the affected interests themselves and reduces the coercive presence of the state. As Peter Schuck has put it:

A bargained solution depends for its legitimacy not upon its objective rationality, inherent justice, or the moral capital of the institution that fashioned it, but on the simple fact that it was reached by consent of the parties affected.⁴⁹

Given their legitimacy, and the process of mutual adjustment which shapes them, bargained solutions are likely to face fewer vetoes and contrived obstacles in the implementation process than those more coercively derived and imposed.

Bargaining processes are, however, susceptible to severe biases which derive from imbalances in the bargaining power and indeed in the participation of affected interests and from particular bargaining strategies. We have reviewed the imbalances among the organizational, financial, and political resources of concentrated and diffuse interests, and of management, labour, consumer, and third-party interests in the health hazards arena above; but it is worth devoting some attention here to biases introduced by bargaining strategies.

These biases have largely to do with the distortion of information, both about preferences and about technical aspects of issues. The ability of affected interests to exploit scientific controversy and uncertainty by presenting those scientific interpretations and inferences which best support their respective policy preferences has also been noted earlier. The bargaining process must rely upon these information biases themselves to counteract each other: it provides no source of information apart from the contending parties. And it provides no mechanism for the resolution of scientific uncertainty itself. It may therefore exaggerate areas of scientific controversy; put another way, it may define legitimate scientific issues as "trans-scientific" issues and resolve them on the basis of negotiation rather than scientific judgement. McGarity refers to this as the problem of the "contrived" science policy (or trans-scientific) issue, in which an affected party may "attempt to convert a well-settled scientific question into a science policy question by locating a very biased or radical scientist . . . to testify that a scientific dispute exists on that issue." 50

The pure bargaining process entails no mechanism, apart from the bargaining power and sophistication of relatively evenly matched participants, for

establishing a boundary between contrived and real trans-scientific issues. Indeed there is no mechanism, again apart from the resources and sophistication of the bargainers, for "smoking out" the assumptions entailed in the models upon which varying scientific interpretations are based and for establishing the core of scientific "fact" upon which the effects of a policy might with as much accuracy as possible be predicted. Bargaining, in short, allows trans-scientific issues to be resolved at the risk of ignoring areas of relative scientific certainty.

Another type of bargaining strategy may reduce the flexibility which this model theoretically offers. As Schelling has pointed out, bargaining power can be manufactured, in a sense, in the absence of other resources, by "binding" oneself to a particular position (for example, by making a commitment to a third-party), and thereby forcing other participants to adjust to one's own position -- a "burning the bridges" ploy.⁵¹ This is, of course, a risky strategy, given the possibility of stalemate; and some sophisticated casuistry may have to be employed by one or more participants to redefine the original commitment and to allow for some movement to reach a negotiated outcome. A related strategy is the assertion of non-negotiable "rights" as a constraint on the bargaining process. Bargaining, based as it is on consent and not on inherent justice, can be disabled by claims of right unless, again, a good deal of casuistic reinterpretation is employed. Finally, bargaining processes are susceptible to a strategy of delay. Such a strategy is likely to be employed, for example, by a participant who believes that delay will give a coalition of other participants time to unravel. But there is an outer limit to the use of this strategy, given the assumption underlying the bargaining model, namely that coming to some agreement is preferred by all participants to failing to reach agreement at all.

The strengths of the bargaining model, in summary, derive largely

from its cognitive and cybernetic characteristics -- from the capacity of face-to-face group dynamics to generate shared perceptions and consensus, from its relatively limited demands upon the information processing capabilities at any one point in the system, and from its iterative and flexible process of "trying out" various proposals and varying them in the light of reactions. The shortcomings of the model relate largely to its analytic weaknesses -- its tendencies to bias the weighting of interests and the review of information according to the bargaining power of the respective parties.

Even the cybernetic strengths of the model in coping with complexity and uncertainty, however, are likely to be realized only under certain conditions. In the first place, affected interests must be roughly equal in bargaining power, informational resources, and expertise so that information biases may counteract each other and scientific and trans-scientific issues realistically identified. In the second place, the political and legal contexts must discourage the assertion of substantive claims of right, which can limit the flexibility of the bargaining process.

The health hazard arena, however, is characterized both by unequally endowed interests and by claims of rights. Bargaining alone is, hence, unlikely to resolve the scientific, political, economic, and ethical problems presented by health hazards. It is likely to leave potential areas of scientific agreement unestablished; to leave diffuse political demand unsatisfied; to reach Pareto inefficient outcomes (by distorting information regarding preferences and technical effects); and to weight interests according to their political and economic endowments rather than through their free and equal interaction.

B. Managerial Discretion

A more common model for the structure of relationships between decision-makers and affected interests in the standard-setting process draws

its theoretical integrity from the analytic paradigm. The model of managerial discretion assigns to one centre of decision-making, apart from the interests affected by the hazard, the responsibility of developing and enforcing specific standards under a general legislative mandate. In theory, the identification and weighting of interests and the generation of information in this model are not dependent on the degree of organization or the bargaining power of particular interest groups. The decision-maker is charged with balancing a variety of interests and values, as more or less explicitly identified in his mandate, regardless of the organization and resources of affected parties. He is free to choose the standard which, in his disinterested, analytic, and "synoptic" view, is most consistent with his mandate; and is not bound to choose from among options presented by affected parties -- or indeed to consult with those parties at all. It is this model that underlies the formal structure of most Canadian standard-setting processes in the health hazard arena.

In the most analytically inspired version of this model, decisions are to be taken in accordance with the precepts of management science and policy analysis: preferences are taken as given in the mandate; complex information is organized into systematic models; decisions about reductions in uncertainty are made on the basis of the marginal net benefit of further information; and alternate standards are compared on the basis of given preferences, analytic models, and available information. Consultation with affected interests may be necessary to refine the model and to obtain information (indeed the typical Canadian practice is to strike informal task forces), but it is totally at the discretion of the decision-maker.

In practice, the discretionary setting of standards by administrators under general enabling legislation is not nearly so analytic. The analytic model assumes a given set of preferences and an information-generating and processing capacity -- but the mandate and the resources which usually accompany the delegation of standard-setting authority are rarely sufficient

in these respects. Typically, in Canada as elsewhere, mandates have been vague (usually because conflicts in preferences have not been resolved at the legislative level), and programmes of standard-setting and enforcement have been added to existing workloads with little increase in resources.⁵² Under such circumstances, theories of organization predict, and experience confirms, that the standard-setting process will be subsumed within the established operating routines of the administering agency. (In the less common case in which a relatively vague mandate is accompanied by resources, on the other hand, the mandate is likely to be reinterpreted in the direction of the goals or "world view" of the dominant coalition within the administering agency. It may indeed precipitate some regrouping of coalitions within the agency.)⁵³

The usual operating routines in Canadian regulatory administration have been likely to involve considerable interaction with the regulated industry, which, in the absence of a specific mandate or of information resources, can provide a source of decision criteria and technical information. The desire to promote a less arbitrary and more comprehensive canvassing of interests and information by regulatory decision-makers, while maintaining a disinterested and independent centre of decision-making, has led to proposals for various forms of guaranteed access by affected parties to regulatory decision-makers. One of these models, which is coming increasingly to characterize administrative rule-making in the United States, is the model of adjudication.

C. Adjudication

54

Following Lon Fuller and Milton Eisenberg, we can define adjudication as a process which structures the relationship between affected interests and decision-makers around the following norms:

- (i) Each party must have the opportunity to present proofs and reasoned arguments for a decision in his favour to the decision-maker.

- (ii) The decision-maker must be impartial and must attend to, and be capable of, comprehending, those arguments.
- (iii) The decision-maker should normally answer those arguments in explaining his decision.⁵⁵
- (iv) The decision should be strongly responsive to the parties' proofs and arguments in the sense that it should precede from, and be congruent with those proofs and arguments and should not be based on principles, facts, or arguments not presented by the parties themselves.⁵⁶

This general model comprises a number of variants, of relative degrees of formality. All entail rights to notice and hearing by an impartial judge; most entail rights to counsel and rights to cross-examine adverse witnesses; and the more formal entail the keeping of a written record against the possibility of subsequent review and increasingly strict rules of evidence.

Traditionally, this model has been held to apply only to those administrative decisions which apply general policy rules to individual parties in specific cases according to their particular circumstances and not to the decisions formulating the general rules themselves. This distinction between "adjudication" and rule-making" has never been clearcut, however, and it is particularly difficult to maintain regarding the standard-setting activities of administrative agencies. Although the standards governing exposure to health hazards, to take the issue at hand, are clearly "rules" in the sense that they are generally applicable and prospective in effect, they may well have a retrospective effect on a relatively small number of identifiable parties. In the extreme case, a ban on a hazardous substance, while prospective from the point of view of those whose exposure to the substance is thereby prevented, imposes costs retrospectively on producers left with existing stocks of the substance, and those with capital (including human capital) investment in its production.⁵⁷

Canadian administrative law, traditionally and currently, defines the range of applicability of the adjudicative model to administrative

decisions narrowly, and allows administrators broad discretion in their rule-making activities. With very few exceptions, moreover, statutes enabling the setting of standards relating to health hazards impose no procedural requirements on the subordinate legislative process. (As we shall see shortly, Ontario's recent Occupational Health and Safety Act is an exception to this rule.)

In the United States, on the other hand, the Administrative Procedure Act has since 1946 required rule-making agencies to follow "notice and comment" procedures involving the publication of proposed rules and the provision of an opportunity for affected parties to respond in writing to those proposals. (Indeed, the APA in effect codified the principles which had already evolved in administrative practice and case law.) In the last fifteen years, moreover, rule-making procedures in the United States have become increasingly subjected to the constraints of the adjudicative model; put another way, the applicability of the adjudicative model has been more broadly defined.

To some extent, this "judicialization" of rule-making procedures in the United States has been the result of Congressional action. Unable to frame specific mandates, Congress has sought to constrain administrative discretion by imposing procedural requirements, on the adjudicative model, upon a wide range of regulatory decision-making. The outstanding example of this sort of Congressional strategy is the 1975 Magnusson-Moss Act (the Federal Trade Commission Improvement Act) imposing formal and elaborate procedures on the FTC rule-making process. In other cases, Congress has supplemented relatively informal procedural requirements with a stringent stand of judicial review. The Occupational Safety and Health Act, for example, provided that rules thereunder may be struck down by the courts on appeal if they

are not supported by "substantial evidence on the record." This standard of review requires agencies to establish the factual basis of their decisions with greater certainty than is required by the standard of review normally imposed under APA notice and comment procedures, namely that rules not be "arbitrary or capricious, an abuse of discretion, or otherwise not in accordance with the law."

Another source of the perception of the increasing judicialization of the regulatory process in the United States is the increasing tendency of affected parties to litigate standards. The increase in the use of litigation (as opposed to electoral tactics) by "citizens lobbies" or "public interest" groups in the health hazard arena has been noted in an earlier section of this paper. It is now not at all unusual -- in fact, it appears to be becoming the norm -- for OSHA rules to be challenged in the courts by a variety of groups, both potential cost bearers and potential beneficiaries of the standard. To a considerable extent, the perception of increasing judicialization is in fact a perception of increasing litigiousness.

U.S. administrative law itself regarding the applicability of the adjudicative model to the activities of regulatory bodies appears to be in a state of flux. Several lower court decisions have tended to a relatively broad application of the formal adjudicative model. In Vermont Yankee Nuclear Power Corporation v. the Natural Resources Defence Council, for example, the DC Circuit Court of Appeal in 1978 used the "substantial evidence" standard of review to hold that the Atomic Energy Commission's informal procedures in a generic rule-making proceeding did not give environmental groups sufficient opportunity to probe and to point out deficiencies in the "evidence" compiled by the AEC staff experts regarding the environmental impact of nuclear power plants, and particularly regarding the scientifically controversial issues of the effects of low level ionizing radiation. In National Advertisers v. The Federal Trade Commission, also in 1978, the

DC District Court extrapolated from the adjudicatory type procedure requirements imposed on FTC rule-making by Magnusson-Moss to disqualify FTC Chairman Michael Pertschuk from participation in the Commission's rule-making regarding children's television advertising, on the grounds that the adjudicative model implies an impartial judge and that Pertschuk had publically taken a partisan position on the issue. The U.S. Supreme Court, on the other hand, has ruled (in its review of the Vermont Yankee case, which reversed the lower court's ruling) that the courts cannot require an agency to adopt more formal procedures in rule-making than are required by its organic statute or by the APA. The Court held that the adequacy of the record in such cases "is not correlated directly to the procedural devices employed."⁵⁸ The distinction between cases which can validly be considered rule-making and those which are adjudicatory, however, remains unclear.

Finally, regardless of whether U.S. courts are judicializing regulatory rule-making by requiring agencies to meet formal procedural requirements, they are certainly judicializing it by themselves taking an active substantive role in the process. The courts are increasingly unwilling to defer to agency judgement in substantive matters, and are increasingly committed to taking a "hard look" at both substantive and procedural aspects of agency decision-making.

In the face of these Congressional signals, litigious interest groups, judicial uncertainties, and judicial activism, it is not surprising that U.S. regulatory agencies are adopting more formal procedures in an increasing number of cases to protect themselves against reversal on appeal. The Occupational Safety and Health Administration, for example, includes a standard clause in notices of proposed rule-making giving the presiding administrative law judge authority to permit the questioning of witnesses, and cross-examination is typically permitted in important cases, such as⁵⁹ asbestos and vinyl chloride hearings.

In Canada, rule-making authority regarding health hazards rests with federal and provincial ministries and cabinets, and few procedural requirements are imposed by enabling statutes. (Various provincial environmental protection acts require or provide for public hearings to assess the environmental impact of specific projects, including matters of health hazards, but even these have been weakened and discredited in some cases, notably Ontario, by liberal use of exemption clauses.) Furthermore, no procedural requirements have been imposed upon ministerial or cabinet standard-setting by the courts. The most recent case addressing the question of a cabinet duty to be procedurally fair in regulatory decision-making involved the federal Cabinet's refusal to allow an appeal by the Inuit Tapirisat of Canada and the National Anti-Poverty Organization of a Canadian Radio-Television and Telecommunications Commission decision regarding a Bell Canada rate increase. The ITC and the NAPO contested the Cabinet decision before the Federal Court on the grounds that their full petition had not been circulated to Cabinet, and that they had not been given an opportunity to respond to Bell's reply to their petition, nor to see and respond to confidential opinions and evidence provided by the Minister of Communications and his staff, and by the CRTC itself. When the case reached the Federal Court of Appeal, Mr. Justice LeDain, writing for a unanimous court, ruled that Cabinet has a common law obligation to be procedurally fair in cases of appeals from regulatory decisions. He did not specify what fair procedures might be in such cases, nor did the ruling explicitly speak to the issue of a Cabinet duty to be fair in making regulatory decisions in the first instance.⁶⁰ In any event, the Federal Court decision was overturned by the Supreme Court on appeal in 1980. The Supreme Court held that in the absence of express statutory provisions, "there is no need for the Governor in Council to give reasons for his decision, to hold any kind of hearing, or

even to acknowledge the receipt of a petition." Indeed, even in reviewing regulatory decisions of independent regulatory agencies, Canadian courts have shown enormous restraint compared with the U.S. counterparts. They have granted agencies broad discretion in substantive and procedural matters, applying only standards of ultra vires and natural justice to agency decisions, and interpreting the range of applicability of the adjudicative model (especially its more formal variations) very narrowly.

There have been a number of recent proposals for the imposition of procedural requirements upon Cabinet decision-making in regulatory matters. At the federal level, indeed, an administrative directive of the Treasury Board (the Socio-Economic Impact Analysis programme noted earlier) instructs departments and agencies subject to Treasury Board review to follow certain notice and comment procedures in the preparation of "major" regulations involving matters of health, safety, and fairness. For the most part, these proposals and reforms are derived more from a "consultative" model of the structure of relationships between decision-makers and affected interests than from an adjudicative model, and we shall discuss them more fully in that context below. At this point, however, it is worth noting that this wariness of the adjudicative model in Canadian reform efforts, at least in the arena of the regulation of health hazards, is all to the good.

Although the procedural fairness of the Canadian standard-setting process regarding health hazards is clearly in need of vast improvement, it is important that reform efforts not be modelled too closely on adjudicatory procedures. The adjudicative model in theory has undeniable advantages. It guarantees affected parties or their representatives face-to-face access to decision-makers and often to opposing parties. Its dynamics, more than any other model, demand that the factual basis of decisions be carefully scrutinized, from both adversarial and "impartial" viewpoint. And it

requires that decisions be legitimated by overarching principles of "right" and "wrong" and not simply reflect the balance of power in the health hazards arena.

The disadvantages of adjudication, however, are also considerable. It exacerbates conflict, structuring relationships on an adversarial basis and creating clear "winners" and "losers" in each case, and enhances the likelihood that the loser will seek to delay implementation of the decision through further appeal or other tactics of obstruction. To a greater extent than the bargaining model (but less than the model of managerial discretion) it further alienates both winners and losers from the decision-making process by making them aware of their loss of freedom to an institution of the state. It distorts information, not only by encouraging adversarial presentations of facts and preferences, but also by requiring those presentations to meet certain rules of evidence; and it leaves decision-making authority with an arbiter without an intuitive "feel" for the issues at hand. To a greater extent than any other model, it increases the likelihood that parties will advance relatively inflexible claims of right or accusations of guilt. Indeed, as Fuller has noted:

It is not so much that adjudicators decide only issues presented by claims of right or accusations. The point is rather that whatever they decide, or whatever is submitted to them for decision, tends to be converted into a claim of right or an accusation of fault or guilt. This conversion is effected by the institutional framework within which both the litigant and the adjudicator function.⁶²

Finally, adjudication appeals to precedent in what has been called the "gradual tracing out of the full implications of a system already established";⁶³ and it is ill-suited to finding innovative solutions to conflicts between interests which have not been resolved even in general terms through a contract or through an accommodation of interests at the legislative level.

These shortcomings may well be outweighed by the power of the adjudicatory process to clear through adversarial presentations to a core of established fact and to maintain the role of principle as opposed to power balance in the operation of the state. But it is likely to do so only to the extent that the issues do indeed revolve around a firm core of established fact, implicate principles of "right" and "wrong," and affect a range of interests which is capable of being captured in a single dispute. In the health hazards arena, these conditions do not prevail. Pervasive complexities and uncertainties, particularly in the scientific field, limit the applicability of the adjudicative model. In the first place, the adjudicative process is unsuited for the resolution of trans-scientific or science policy issues. Scientific evidence is treated in this model as factual evidence, but as we have seen, the degree of certainty with which scientific facts can be stated in the health hazards arena is relatively low. Extrapolation from limited data, the construction of research designs and test methodologies, and the construction of interpretative models all involve the exercise of scientific judgement. Careful examination and cross-examination of expert witnesses may be useful to identify the assumptions underlying different scientific models and the different interpretations of, and inferences from, existing data. But as McGarity has noted in a review of OSHA experience with the adjudicative model, "[t]he administrative and judicial review process . . . can test these assumptions . . . only to the extent that a lay person's understanding

64

is an appropriate litmus," To require that administrators and courts follow an adjudicative model in decision-making about health hazards tends to demand that decisions be based on scientific evidence where the level of uncertainty requires that they be based on policy. In other words, whereas bargaining risks treating scientific issues as trans-scientific, adjudication risks treating trans-scientific issues as scientific.

The applicability of an adjudicatory model to standard-setting regarding health hazards is limited not only by the uncertainties associated with the issues involved but by their complexity. Building upon Lon Fuller's analysis, Milton Eisenberg has argued that the "norm of strong responsiveness" inherent in the adjudicative model (that is, its requirement that the judge's decisions proceed from the arguments, and only from the arguments advanced by the parties appearing before him) makes it ill-suited for the resolution of "polycentric" problems.⁶⁵ Polycentric problems are those involving complex interactions among a large number of interests, such that different solutions may implicate different sets of interests (or, put another way, different solutions may change the parameters of the problem). Fuller analogized the polycentric problem to a spider web, which is "many centered -- each crossing of strands is a distinct centre for distribution of tension."⁶⁶ To limit the focus of decision-making (through the norm of strong responsiveness) essentially to two opposing interests in a given dispute -- in Fuller's analogy, to a single "crossing of strands" -- ignores the overall structure of the problem, the complex web of interactions.

Polycentricity is a matter of degree, and the scope of adjudication would be narrowly defined indeed if all polycentric tasks were placed beyond its pale. Nonetheless, problems of health hazards are polycentric to a very high degree: they involve complex interactions due not only to political and economic interdependencies but also to the operation of biological and ecological systems. In this context the following critique of adjudicative procedures is particularly relevant:

Polycentric problems can be solved only by taking account of numerous interdependant and highly variable factors which oblige the decision-maker to manage a kind of cybernetic process involving tentative probe, feedback, adjustment, and reconciliation Such a problem (for example, the selection of a water quality standard) requires the exercise of substantial discretion rather than the application of pre-existing decision rules, and its solution

will often require interaction between the decision-maker and others -- interaction that would be inconsistent with traditional norms of litigation.⁶⁷

Some U.S. commentators, notably Abram Chayes, have detected the emergence of a "public law" model of litigation in which the judge plays a more active role in negotiating with and encouraging negotiation among the parties to a dispute and indeed at times with other interests, and in which the judgement focuses on a prospective regime rather than on retrospective compensation.⁶⁸ Even in this model, which is highly controversial in the U.S. and utterly foreign to less activist Canadian courts, the focus remains on the adversarial interests represented in a given case, and encourages those involved at least initially to stake out positions on the grounds of relatively inflexible claims of right and wrong.

It is conceivable that certain polycentric problems could be solved through the exercise of managerial authority aided by systems analysis, or through a process of bargaining which represents all affected interests.⁶⁹ (The concept of polycentricity was first developed by Michael Polanyi in a critique of the effectiveness of these two models.) But each of these models suffers from the limitations and biases suggested earlier, affecting the weighting of interests and the processing of information. It remains to consider a hybrid model, the model of consultation.

D. Consultation

The consultation model combines elements of each of the models discussed so far: bargaining, managerial discretion, and adjudication. Like the adjudication model, it assures affected interests of the opportunity to present arguments (though not necessarily face-to-face) to the decision-maker in authority, and obliges decision-makers to attend to those arguments and to respond to them in explaining their decisions. Like the model

of managerial discretion, it leaves the decision-maker freer to gather his own evidence and to base his decision on considerations not adduced by any party. Like both managerial discretion and bargaining, it admits the relevance of a wide range of "evidence" of varying degrees of certainty. And although it does not explicitly encourage bargaining among affected interests, it does at least free and indeed encourage decision-makers to enter into negotiation with affected interests, thereby expanding the range of options considered and encouraging innovative solutions.

The consultation process in practice may take a number of institutional forms of varying degrees of openness. At one extreme, it may entail only the striking of advisory committees representative of a range of affected interests, whose reports may or may not be made public. In the mid-range are minimum notice and comment procedures such as those governing the promulgation of regulations relating to "designated" hazardous substances under Ontario's Occupational Health and Safety Act, which requires that the Minister of Labour:

- (a) shall publish in The Ontario Gazette a notice stating that the substance may be designated and calling for briefs or submissions in relation to the designation; and
- (b) shall publish in The Ontario Gazette a notice setting forth the proposed regulation relating to the designation of the substance at least 60 days before the regulation is filed with the Registrar of Regulations.⁷⁰

Access to submissions by affected parties may be more or less restrained under such provisions -- in the Ontario case it is granted at the discretion of the Minister. Somewhat more open and interactive procedures are typical under the notice and comment provisions of the Administrative Procedure Act in the U.S. noted earlier, which explicitly admit of the possibility of oral testimony and which place some obligation on decision-makers to explain their actions.⁷¹ Even more explicit in its requirements for explanation

(though less firm in its authoritative base) is the SEIA programme of the federal Treasury Board in Canada. Under this programme, the Treasury Board has instructed all departments and agencies under its purview (including all those engaged in health and safety regulations) to publish in draft form all "major" regulations touching upon matters of health, safety, and fairness, to accompany the publication with a socio-economic impact analysis assessing the cost and benefit of "all technological and policy-instrument alternatives considered," to allow 60 days for public comment upon the proposed regulation and accompanying SEIA, and to reply to those comments. Most extensive in terms of their requirements of explanation are the provisions of President Reagan's recent Executive Order in the U.S. which, as noted earlier, required regulatory impact analyses to accompany both notices of intent and drafts of "major" rules.⁷²

Before addressing some of the specific aspects of these various approaches to consultation, it is worth taking a general evaluative look at the basic elements of the model: assured participation for a range of affected interests, interaction between decision-makers and affected interests on the basis of reasoned argument, and ultimate administrative discretion.⁷³ As a hybrid, the consultation model exhibits some of the shortcomings as well as the strengths of the models discussed so far.

In the first place, like bargaining and adjudication, it delays decision-making. The 60-day comment periods usual under notice and comment requirements are typically exceeded, particularly where the leadership and staff of interest groups can argue persuasively that more time is needed not only to digest and respond to government analyses but also to have their own submissions reviewed and approved by their respective memberships. The informal procedures themselves, however, are less time consuming, and less subject to manipulation than are those (such as cross-examination and judicial

review of the record) imposed by the adjudication model. And the fact that ultimate discretion remains with the administrative decision-maker reduces the pressure that an interest group can bring to bear by delaying indefinitely, as is possible in a pure bargaining process.

Like each of the other models, moreover, the consultation process is susceptible to limitations and distortions in the flow of information; but the problems are least acute in this case. The tolerance of uncertainty is greater in a consultation process than it is under an adjudication model with the latter's template of "facts" and "law." The biases of adversarial sources of information which characterize the bargaining and adjudication models remain problematic here, but at least the consultation process leaves the administrative decision-maker free to develop information and analysis independently. (In practice, of course, it is often the case that adversarial interests remain the only source of certain crucial information such as past exposure levels and medical histories -- in which case only a trial-type adjudicative process with powers to compel the production of documents and records could free such information. Given the scientific uncertainties surrounding the interpretation of such data, however, it is unlikely that the benefits of access to them would outweigh the loss of flexibility in the exercise of policy judgement by going the adjudicative route.) Furthermore, while leaving the decision maker free to garner his own information, a consultation process does not leave him dependent on his own resources or on his own judgement in identifying relevant information and sources of information. By guaranteeing a wide range of interests access to the centre of decision-making, consultation procedures potentially uncover information which might be ignored under a model of pure managerial discretion.

The feasibility of consultation and the realization of its potential advantages depend, of course, on the particular institutional devices adopted: their degree of formality, their phasing and their scope. There are some general criteria to be considered in these respects. The logic of the model demands that consultation procedures be sufficiently "institutionalized" that the access of affected interests to the centre of decision-making (at least in terms of an exchange of arguments on paper) is not dependent upon the discretion of the decision-maker. It demands that the process be phased to allow affected interests early and periodic notice of the progression of the decision-maker's thinking about the issues, so that the parties may prepare relevant responses. But notice should not be so early or so frequent that groups become overloaded in responding to matters irrelevant to the ultimate course of decision-making, and hence become alienated from the process.⁷⁴ Institutionally established deadlines for response should not be immutable, but should be available to be invoked to thwart strategies of delay on the part of particular interests. Finally, to avoid the deliberate or unintentional overloading of the process, there should be some mechanism for exempting routine or insignificant matters from its requirements.

Against these general criteria it is possible to assess a number of versions of consultative structures and processes. Let us consider first the use of advisory committees representative of a range of affected interests.

Although the logic and effectiveness of the consultation model require that advisory committees have some legislative base and not be struck entirely at the discretion of the administrative decision-maker (setting aside for the moment the question of the bureaucratic position of this decision-maker), the actual structure of the committee may exhibit varying degrees

of permanence and formality. The enabling statute might, for example, require the administrative standard-setter to strike and to disband advisory committees on a serial basis as particular hazards are considered.⁷⁵ Although this approach provides for a recruiting of representatives with expertise and interests specific to a given hazard, these advantages are likely to be outweighed by those of a permanent advisory committee. A number of trans-scientific issues -- such as the validity of extrapolations from high- to low-dose effects or from effects in laboratory animals to effects in humans -- recur as particular hazards are considered; and there is much to be gained from a continuing panel whose members do not have to resolve these issues anew in each instance. Furthermore, a permanent committee can be provided with a research and analysis capability -- a capability essential to the effectiveness of the consultation procedure. Given the extent of the politicization of the scientific debate surrounding health hazards, and the varying resources of affected interests, it is likely that the only credible research and analytic enterprise is one conducted under the aegis of a body representing various contending groups in a specific jurisdictional context.

In this respect, both British and American experience can be instructive. The British Health and Safety Commission, whose membership comprises representatives of labour, business, consumer associations, and local authorities, as well as scientific and medical experts, provides an ongoing aegis for the scientific evaluation of health hazards, such as that recently undertaken by its Advisory Committee on Asbestos (with a membership mirroring that of the Commission itself). Such a broadly representative group would appear, both on its face and in the light of experience, to be more credible to a wide range of affected interests than are agencies more closely identified with government itself. In

the United States, for example, the National Institute for Occupational Safety and Health has been perceived by industrial groups as having been "captured" by occupational health advocates unsympathetic to business interests, and its relationship with the business community has tended to be adversarial.

The research and analysis overseen by an advisory committee need not be conducted entirely in-house; indeed, the most effective use of available facilities and expertise is likely to entail a largely funding role for the committee. This approach is, of course, not without its pitfalls, as recent revelations of fraudulent testing of pesticides by the private Industrial Biotest Laboratories under U.S. government contract has indicated; and the committee should possess sufficient in-house research and analytic capability to give close scrutiny to contract and grant research.

The credibility and effectiveness of an advisory committee depends essentially upon the manner of its composition: upon the range of interests represented and upon the relationship between the representatives and their respective constituencies. The range of interests is particularly problematic in the health hazards arena, with its pervasive externalities and concomitant difficulties of representing diffuse third-party interests. Furthermore, as the Economic Council of Canada noted in the Interim Report of its Regulation Reference, there are usually "a set of obvious candidates" for participation in the consultative process, a phenomenon which carries the danger that governments will fall into "the convenient habit of consulting only with 'established' groups."⁷⁶ There is no effective way of avoiding this danger through a legislative stipulation of committee

membership while still preserving the flexibility which is the major advantage of a consultation process. But the problem is less acute if the advisory committee approach is complemented by notice and comment procedures, assuring access for, and attention to, a much wider range of interests.

Before discussing such procedures in more detail, one further point regarding the committee's composition -- the formal relationship between committee members and the interests which they represent -- needs to be made. Recent theories of public accountability, shaped by a pluralist approach to the understanding of politics, have argued strongly that "one is accountable to agents who control scarce resources one desires," that the accountability of a representative to his constituency is only as great as the sanctions which can be exercised against him by the constituency. Applying this argument to the case of the representation of affected interests in the regulatory process, some commentators have argued that to be effectively accountable to their respective constituencies, representatives must be specifically nominated by organized groups within those constituencies, who then hold the sanction of renewing or rescinding the nomination.⁷⁷

Tuohy has expressed her reservations about this prescription at some length elsewhere.⁷⁸ Apart from the fact that it favours the organized over the unorganized segments of particular constituencies, it can lead to the taking of relatively inflexible positions by participants. This results not only from a desire on the part of delegates to be able to present themselves to their constituents as vigorous defenders of constituency interests, but also from the logic and strategy of bargaining through agents. Schelling's point about the bargaining power to be gained from establishing a credible commitment to a particular position is relevant in

this context.⁷⁹ He argues that such a commitment can be made credible where a delegate can assert that he is bound to carry out his mandate or lose his position with his parent organization, and that gaining approval for such a change in position would entail a process too lengthy to be accommodated in the timetable of the negotiating process. To reduce the significance of these tactics and incentives, it is preferable that representatives be drawn from identifiable constituencies of interest but not nominated or appointed by specific organizations. A statutory clause such as that contained in Ontario's Occupational Health and Safety Act regarding the composition of the Advisory Council on Occupational Health and Occupational Safety established there strikes an appropriate balance between assured access for relevant constituencies and freedom of action for both administrative decision-makers and constituency representatives. That statute provides that the Council's 12 to 20 members:

. . . shall be appointed for such term as the Lieutenant Governor in Council determines and shall be representative of management, labour, and technical or professional persons and the public who are concerned with and have knowledge of occupational health and occupational safety.⁸⁰

Great care must be taken in the selection of members of such a committee; it is, after all, the only forum in which affected interests will be guaranteed the important resource of face-to-face access to the centre of decision-making. Even so, standing alone, these provisions for a representative advisory committee are insufficiently comprehensive in the range of interests to whom access is assured, and offer insufficient checks on the "convenient habit" or cognitive routine of consulting only conventional sources of information. Advisory committees need to inform and to be informed by a broader scan of interests and information through notice and comment procedures. Through such procedures, constituencies unrepresented on the advisory committee, or segments of constituencies who disagree with the position taken by their "representative" on the committee, are assured an opportunity to gain the attention of decision-makers.

The institutional basis of these notice and comment procedures should comprise a set of statutory provisions. Enabling legislation should require an administrative decision-maker, once he has tentatively determined in consultation with an advisory committee to set or modify a standard regarding control of a health hazard, to publish a notice of such intent, and to allow a comment period of specified length to be accorded for the receipt of written submissions. After this period, another provision should require the publication of any proposed standard and the according of a second comment period before the standard becomes effective. As to the content of these notices, the enabling legislation should require that the initial notice of intent be accompanied by a statement of the general lines of argument and evidence upon which the decision was based; and that the publication of the proposed standard itself be accompanied by a general outline of the arguments and evidence supporting that particular standard.

It is important that these requirements for explanation not be overly ambitious. In the light of the limitations and biases of cost-benefit and cost effectiveness analyses outlined above, the requirements of the federal SEIA programme provide an example of what is to be avoided in statutory prescriptions. The Treasury Board Directive states that each analysis must include:

. . . identification of all technological and policy-instrument alternatives considered and discussion of the feasibility of each alternative, including status quo alternatives; for each feasible alternative, cost and benefits should be identified, estimated and compared as is appropriate.⁸¹

It also provides that:

An analysis of the impact of the following non-allocative factors shall be presented wherever appropriate: income distribution and regional balance, technological progress, market structure and competition, output and employment, balance of payments and international competitiveness, energy consumption and inflation.⁸²

As noted earlier, it is difficult in standard-setting procedures to avoid the deadlocks resulting from partisan cost-benefit analyses with their highly manipulable assumptions, but it is not necessary to invite such problems. Nor is it practical to invite delay by requiring a given set of decision-makers to manufacture a wide range of options to meet paper requirements. Innovation is more likely to arise from diversified sources of information and analysis than from paper requirements to "identify alternatives." In a similar vein it is worth noting that SEIA-type requirements tend to defeat one of the major purposes of notice and comment procedures: that is, to ensure that relevant interests and evidence are not overlooked -- by channelling the consultation process into areas accessible largely to those "cerebral prestidigitators" capable of manipulating the techniques of cost-benefit analysis. The results, moreover, are likely to be ultimately unpersuasive and unhelpful to decision-makers increasingly skeptical of such manipulations.

While not requiring an elaborate setting out of evidence and analysis, the statute ought nonetheless to guarantee access for all parties to the various "partisan analyses" and submissions generated by the process and to the reports of the advisory committee as well. If a genuine joining of issues appears to be emerging as interest groups attempt to rebut each other's submissions, it may be necessary to extend one or other of the comment periods, or even to bring the groups face to face in an informal hearing; but such options should be left to the discretion of the decision-maker lest they become routinely exploited in the bargaining strategies of particular groups.

The resource implications of these provisions, and their demands on the patience of the participants, require that some limit be placed on the range of standard-setting instruments to which they pertain. It is tempting to limit their application to a particular class of instruments defined by its legal status (such as regulations); but to do so would provide a clear incentive for administrators wishing to circumvent the process to use an exempt instrument such as a guideline or directive which may have equal effect though it involves different sanctions. The Economic Council of Canada's Interim Report noted this problem in framing its own proposals for notice and comment procedures in the regulatory process:

Instruments subject to advance notice requirements would include regulations, orders, rules, ordinances, by-laws, and proclamations... . The fact that an agency uses a directive rather than a formal statutory instrument should be irrelevant.⁸³

The Council noted an analogous position taken by the Standing Joint Committee on Regulations and Other Statutory Instruments of the federal Parliament:

Any departmental guidelines, directives or manuals which contain substantive rules not contained in statutes or in other statutory instruments should be included within the definition of a statutory instrument and subject to parliamentary scrutiny. This inclusion should extend to guidelines, directives, etc. which constitute instructions to staff where the rules so made are applied to or in respect of non staff members or where the breach of the rules can lead to disciplinary action against the staff member committing the breach.⁸⁴

If the standard-setting process is to be subject to consultation requirements regardless of the instrument used, it is particularly important that there be some mechanism of exempting relatively insignificant changes in policy from the full consultation process. The federal SEIA programme establishes an economic threshold; only those regulations whose estimated

social costs exceed specified levels are subject to its provisions. This economic threshold approach suffers from the same problems of cost estimation noted in an earlier section of this paper, however, and provides an incentive for those who would circumvent the consultative process to underestimate costs. On the other hand, exemption at the discretion of the administrative decision-maker undermines the integrity of the consultation process. The most reasonable intermediate course would seem to be to have exemptions from the process routinely reviewed and approved by the advisory committee.

One final point remains to be made in this context. The discussion so far has made reference to "administrative decision-makers" without locating them in the institutional structure. The question of whether regulatory standards ought to be set within government departments and hence under the direct authority of Cabinet, or by semi-independent agencies, has received considerable comment ⁸⁵ without resolution. It is sometimes argued that the semi-independent form allows specialized expertise or impartial judgement to be brought to bear on an issue, with minimum political intervention. Whatever the merits of this argument, one of the major burdens of this paper has been to show that, given the politicization of the health hazards arena, the issues involved in standard-setting cannot be fully resolved on the basis of scientific or economic expertise or on the basis of impartial arbitration.

Even recognizing the inevitability of politics, arguments for or against different organizational forms might still be made. It might be argued, for example, that locating standard-setting authority at the Cabinet level makes it likely that these standards will be influenced by the balance of political forces supporting the party in power; whereas

locating it in a semi-independent agency allows a different political balance to be struck through the representation of various interests in the composition of the agency itself. But in a Cabinet government, the principle of ministerial responsibility demands that a minister ultimately assume responsibility for a standard whether it is developed by his department or by a semi-independent agency within his portfolio. And the principle of Cabinet collegiality demands that his Cabinet colleagues be prepared to defend the standard as a matter of government policy, whether the relevant regulation was made by the Cabinet or by a semi-independent agency. What this means is that the overall influence of the governing party, through Cabinet, is likely to depend more on the contentiousness and politicization of the issue at hand than on organizational structure. Given the procedural concerns discussed throughout this section, moreover, the standard-setter's obligation and ability to receive public advice from a representative advisory committee and to follow notice and comment procedures is more important than where he sits in the administrative apparatus.

E. Incentives in the Consultation Process

Our advocacy of consultative procedures obliges us to lay out in somewhat greater detail our expectations about the incentive structure of the various participants, and about the dynamics of their interrelationships.

As we argued in an earlier chapter, bargaining relationships among affected interests in the public policy arena differ from private bargaining relationships in a number of respects. In the first place, the

public policy arena makes relevant a range of political resources -- notably ideological and symbolic resources -- which are less significant in private bargaining. Ideological and symbolic factors are not irrelevant in private bargaining, of course, given their importance in cognitive processes. But they are particularly significant in the public policy arena because of their place in the incentive structures of public sector decision-makers. Ideological and symbolic aspects of policy can be of considerable significance in maintaining political support among broad constituencies who are not closely attentive to the specific tangible effects of a given policy.

Similarly, interaction among interests in the public arena increases the scope for coalition-building. Again this is an effect of introducing the incentive structure of the public sector decision-makers who must maintain a coalition of support across a variety of policies, involving various constituencies of interest to a greater or lesser extent. The possibilities for log-rolling are thus enhanced.

This view of the incentive structure of the public sector decision-maker is highly political, as is undoubtedly appropriate where standard-setting decisions are ultimately made at Cabinet level. But we need also to consider the incentive structure of the bureaucratic officials who effectively carry out the process of drafting standards in consultation with affected interests. To a large extent the incentives of these decision-makers will be shaped by those of their political superiors, who must ultimately endorse their own decisions. But these incentives are likely also to derive from their professional orientations. Such orientations are likely to have a greater influence in the choice of types of standards (engineering controls, personal protection devices, performance standards) and monitoring techniques than in the choice of an optimal level of exposure. Professional competence,

that is, is likely to be seen as relating to the means to achieve an objective set on the basis of social or political judgement.

Professional orientations do, nonetheless, affect attitudes to risk. The professions of greatest relevance in the health hazards arena, both internationally and in Canada, have been those of industrial hygiene and industrial engineering. By and large, the orientation of these professionals have been interventionist and, as Kelman has noted, "pro-protection." "They tend to believe... that larger reductions of risk are preferable to smaller reductions (without much consideration of cost)."⁸⁶ The institutional aegises of these professional communities, however, may mitigate this orientation. Many members of these communities are employed by industry, and come to share industrial concerns with the costs of risk reduction; and these concerns can be transmitted through collegial interaction to professionals in standard-setting agencies. Relatively small but growing numbers of professionals in health hazard control are employed by labour unions or 'public interest' groups, or are affiliated with such groups while maintaining an academic base.

Whether the professional orientation to risk reduction will dominate the effects of interaction with industry-affiliated professionals depends to a large extent on the degree of institutional dependence between the regulating agency and the regulated industry. Where, as has been the case in Canada, standard-setting programmes are mounted with limited resources, professionals in the standard-setting agency are likely to rely heavily on their counterparts in industry. Where the agency has greater resources, as has been the case (at least until recently) in the U.S. Occupational Safety and Health Administration, it is more likely to be able to define its mission more independently of industry and more in accordance with strictly professional concerns.⁸⁷

The incentive structures of public sector decision-makers are relevant not only because they are brought to bear directly upon decision-making, but because they influence the incentive structures and strategies of other participants in the process. Under a consultation model, affected interests deal with public sector decision-makers, and with each other, in the "shadow" of an imposed public sector decision. Each party will seek to put together a politically strategic coalition in the support of its preferred option or options, and its incentive to do so will depend upon the relative unattractiveness of the likely imposed solution.

The introduction of an authoritative public sector decision-maker, that is, not only creates a new power centre but also shifts the balance of power among affected interests. As noted, it increases the strategic significance of ideological and symbolic appeals. In turn, this means that interests which are relatively disadvantaged in private bargaining may be better off in the public arena. Widespread and diffuse third-party and consumer interests still face free-rider problems and substantial information, transaction, and agency costs, but their bargaining power is increased by being able to appeal to politically salient ideological suspicions of corporate power and symbolically powerful social myths regarding the sanctity of life. Labour interests may enjoy similar ideological and symbolic advantages (although suspicion of the power of organized labour is also ideologically significant).⁸⁸

These ideological and symbolic similarities, as well as some overlap of concern with risk-reduction, also provide ground for coalition-building among organized labour and citizens lobbies. But the interests of these groups are not identical; nor are the kinds of accommodations they are willing to reach with industrial interests in building an effective coalition of support for a standard. Workers may be willing to keep a hazardous substance in production as long as they can be compensated through higher wages or protected through workplace controls;

third-parties, lacking a mechanism of compensation, may argue for a severe curtailment of production, or may oppose workplace controls which involve the discharge or disposal of the substance into the general environment. The incentive of any interest group -- industry, labour, third-party, consumer -- to enter into a coalition depends very much upon what it expects to happen in the absence of a mutual accommodation among affected interests. Any given interest is more likely to reach an accommodation with others if it fears that it would be worse off under an imposed solution. And this expectation, in turn, depends upon its reading of the incentive structure of public sector decision-makers.

In this respect, ironically, the very complexities and uncertainties in the health hazards arena may be advantageous. In the present climate, it is extremely difficult to predict what a public sector decision-maker will judge to be a politically optimal (let alone an economically, scientifically, or ethically justifiable) standard. Industrial groups may fear that the increasing mobilization of, and media attention to, labour and third-party interests will necessitate a political response inimical to their own interests. Labour and third-party interests, conversely, may suspect that past patterns of pragmatic interchange between regulatory agencies and regulated industries may prevail. Industry may see the professionalism of agency officials as likely to lead to an over-concern with risk-reduction; labour and third-party groups may see a professional network linking the agency to industry. Each group, in short, has reason to believe that an imposed situation might leave it worse off than would a mutual accommodation with other interests; and each therefore has an incentive to negotiate.

It is possible that experience with the consultative process in a given agency could add to a greater predictability of agency response. Given the volatility of the political field and the rapidity of

technological change, however, it is unlikely that the complexities and uncertainties in the health hazards arena will be substantially reduced in the foreseeable future. These conditions, somewhat paradoxically, both necessitate and facilitate an accommodation of interests through a consultative standard-setting process. The consultation process, in that sense, makes a virtue of necessity.

IV. Conclusion

A consultative standard-setting process appears, on balance, to be the policy instrument best suited to resolving the scientific, economic, political, and ethical problems presented by health hazards such as asbestos. We have sketched the broad outlines of such a process in this chapter, without attempting to translate it into Ontario's specific institutional context. Such a translation would take us well beyond our task in this paper. Nonetheless, a few brief comments are in order.

In the occupational health arena, the model we are proposing is already substantially in place in Ontario, with the Advisory Council on Occupational Health and Occupational Safety and a notice and comment procedure for regulations designating hazardous substances. Transposing or extending these structures and processes to deal with hazards in the general environment presents more troublesome problems. As noted in Chapter 4, the politics of this arena differ somewhat from those of the occupational arena: risks are generally more thinly spread and risk-bearers less well-organized, while the potential costs of risk-reduction are at least in the first instance concentrated upon well-organized industrial interests. Furthermore, public attention is still largely at the stage of "alarmed discovery" without having confronted the question of the costs of control.

In such a climate, the problems of transaction costs and accountability mechanisms faced by risk-bearers are even greater than in the occupational

arena. It will therefore be more difficult for such interests to participate effectively in an advisory committee and in notice and comment procedures. Furthermore, it may be less necessary politically to include third-party interests in the process of negotiating specific standards: such thinly spread interests may not be sufficiently mobilized or attentive to be able to wield effective vetoes at that level. From the political decision-maker's point of view, it may be sufficient to establish a standard-setting process as a symbolic response while effectively consulting with relatively well-organized industrial and perhaps labour interests. On ethical grounds, then, it may be necessary, particularly in the environmental arena, to buttress the standard-setting process with other policies protective of third-party or other politically disadvantaged interests.

We shall address some such policies in the next chapter. To anticipate that discussion, let us raise a more general set of concerns. Although public standard-setting may be, on balance, the policy instrument most suited to dealing with asbestos-related health hazards, it remains an imperfect instrument. Some of its imperfections arise from constraints on the bargaining process implicit in consultation. Political constraints, as just noted, may inhibit an ethically acceptable balance of power. Political and economic constraints together may lead to inefficient outcomes: where the welfare maximizing standard is one which would drive the industry out of existence, for example, industrial and labour interests can hardly be expected to bargain to such an outcome; and given the political significance of those interests, the actual outcome of the process is likely to be economically sub-optimal.

Other imperfections of the standard-setting process may arise during the enforcement stage. A thorough-going discussion of implementation problems is best undertaken within specific institutional contexts, and is hence beyond our scope in this paper. Nonetheless, in the next chapter we shall sketch out in very brief and general terms some of the implementation issues which must be confronted, and shall suggest the broad outlines of some possible solutions.

A recognition of the limitations of a standard-setting approach hence forces us to consider a range of supplementary policies. It would appear, indeed, that what we are seeking is not the optimal policy but the optimal mix of policies. Our final chapter is addressed to a consideration of such a mix.

Notes to Chapter 9

1. A Similar categorization of decision rules is to be found in P. Nemetz et al. Regulation of Toxic Chemicals in the Environment, Regulation Reference, Working Paper No. 20 (Ottawa: Economic Council of Canada, 1980), pp. 48ff.
2. Milton Wessel, Science and Conscience (New York: Columbia University Press, 1980), pp. 22ff. Wessel cited Rachel Carson's The Silent Spring (Boston: Houghton-Mifflin, 1962) as the quintessential expression of this view, but one is reminded of a spate of writings on the theme of the "technological society," Notably Jacques Ellul, The Technological Society (New York: Vintage, 1964); Rene Dubos, Man Adapting (New Haven: Yale, 1965); and Barry Commoner, Science and Survival (Letchworth, Hertfordshire: Garden City Press, 1963).
3. One of the most outstanding examples of such mobilization occurred in response to the proposed ban on saccharin by the U.S. Food and Drug Administration. In 1977, citing evidence from Canadian government-sponsored bio-assays which suggested an excess risk of bladder cancer associated with the ingestion of saccharin, the FDA stated that it was bound by the Delaney amendment to ban the addition of saccharin to food and beverage in the U.S., and announced its intention to do so. (It has been suggested that the FDA's hidden agenda was to demonstrate the rigidity of the no-risk principle). After an intensive lobbying campaign by saccharin manufacturers and consumers (including the highly publicized "Saccharin Special" -- a train bringing a large group of diabetics and formerly obese persons to testify at an FDA public hearing in May 1977) Congress took the unusual step of imposing an 18-month moratorium on the FDA's proposed ban. The moratorium was renewed when the 18 months had expired. These events are reviewed in R.W. Rhein and L. Marion, The Saccharin Controversy (New York: Monarch, 1977).
4. Roger Williams, Government Regulation of the Occupational and General Environments in the United Kingdom, the United States, and Sweden, Background Study No. 40 (Ottawa: Science Council of Canada, 1971), pp. 114-116, 36.
5. Nemetz et al., op. cit. note 1, at p. 198.
6. Williams, op. cit. note 4, at p. 198.
7. Ibid., p. 115.
8. "Reining in the Regulators," Time, 15 June 1981, p. 53.
9. Occupational Safety and Health Act, Section 6(b)(5).
10. "Justices Decide U.S. Must Protect Workers' Safety Despite High Cost," New York Times, 17 June 1981, reporting the decision in American Textile Manufacturers Institute v. Donovan.
11. Ibid.
12. James C. Miller III, then administrator of information and regulatory affairs, Office of Management and Budget, quoted in Newsweek, 29 June 1981.

13. Robert Anderson, "The Federal Regulation-Making Process and Regulatory Reform, 1969-1979," in Government Regulations: Scope, Growth, and Process, ed. W.T. Stanbury (Montreal: Institute for Research on Public Policy, 1980).
14. Economic Council of Canada, Responsible Regulation: An Interim Report (Ottawa: Ministry of Supply and Services, 1979), pp. 76-77. In its final Report, the Council simply stated that it had decided "not to alter or amend any of its earlier recommendations" regarding the regulatory process. Economic Council of Canada, Reforming Regulation (Ottawa: Ministry of Supply and Service, 1981).
15. Robert Nisbet, "Defending Cost-Benefit Analysis: Replies to Steven Kelman," Regulation (March/April 1981): 42.
16. Robert Dorfman, "Forty Years of Cost-Benefit Analysis," Discussion Paper No. 498 (Cambridge: Harvard Institute of Economic Research, August 1976), p. 16.
17. Edith Stokey and R. Zeckhauser, A Primer for Policy Analysis (New York: Norton, 1978), p. 155.
18. Christopher C. DeMuth, "The Regulatory Budget," Regulation (March/April 1980): 29-43.
19. Dorfman, op. cit. note 16, at pp. 7-15.
20. Consider, for example, a simple hypothetical case in which the benefit/cost ratio has been estimated as $8/2 = 4$. The effect of introducing consideration of an additional negative outcome with an estimated value of -4 can vary considerably. If this additional outcome is included in the numerator as a "negative benefit," the ratio becomes $8-4/2 = 2$. If it is included in the denominator as a cost, the ratio becomes $8/2+4 = 1.33$.
21. "Deregulation HQ: an Interview on the New Executive Order with Murray L. Weidenbaum and James C. Miller III," Regulation 5:2 (March/April 1981): 15.
22. Stokey and Zeckhauser, op. cit. note 17, at p. 148.
23. One of the most notable contributions to this literature, which at once summarizes much current thinking and pushes it forward, is R. Zeckhauser, "Procedures for Valuing Lives," Public Policy 25:4 (Fall 1975).
24. Ibid., p. 438.
25. John Mendeloff, Regulating Safety (Cambridge: MIT Press, 1979), p. 63.
26. Zeckhauser, op. cit. note 23, at p. 436.
27. Ibid., p. 435.
28. Robert Solow makes the point that inferring society's willingness to pay from the sum of individual decisions is "at worst an error of technique, not a mistaken principle," in "Defending Cost-Benefit Analysis: Replies to Steven Kelman," Regulation (March/April 1981).

29. Steven Kelman, "Cost-Benefit Analysis: an ethical critique," Regulation (January/February 1981): 38.
30. Robert H. Harris, Robert B. Nicholas, and Paul M. Ivy, "Reducing Environmental Risks," Society (March/April, 1981): 17-18.
31. Zeckhauser, op. cit. note 23, at pp. 444-445.
32. Quoted in "Deregulation HQ..." op. cit. note 21, at p. 20.
33. Kelman, op. cit. note 29.
34. James V. DeLong, "Defending Cost-Benefit Analysis: Replies to Steven Kelman," Regulation (March/April 1981): 40.
35. Gerard Butters, John Calfee, and Pauline Ippolito, "Defending Cost-Benefit Analysis: Replies to Steven Kelman," Regulation (March/April 1981): 42.
36. Zeckhauser, op. cit. note 23, at p. 447.
37. John Mendeloff, op. cit. note 25, at p. 63.
38. "Justices Decide..." New York Times, op. cit. note 10.
39. G.B. Reschenthaler, "The Economic Impact of Occupational Health and Safety Regulation," (Paper delivered at the Third Annual Conference of the Canadian Occupational Health Association, Edmonton, Alberta, June 18-19, 1981), p. 2.
40. James Schlesinger, "Systems analysis and the political process," Journal of Law and Economics, 11 (October 1968).
41. C.E. Lindblom, The Policy-Making Process (Englewood Cliffs: Prentice-Hall, 1968).
42. Quoted in Mendeloff, op. cit. note 25, at p. 65.
43. See above, Chapter 5, Section IID, "The Issue Attention Cycle."
44. Aaron Wildavsky, Speaking Truth to Power: The Art and Craft of Policy Analysis (Boston: Little, Brown, 1979), p. 405.
45. Lon L. Fuller, "The Forms and Limits of Adjudication," Harvard Law Review (December 1978): 378.
46. John Steinbruner, A Cybernetic Theory of Decision (Princeton: Princeton University Press, 1974), pp. 121ff; Robert Presthus, Elite Accommodation in Canadian Politics (Toronto: Macmillan, 1973); Theodore Lowi, "Decision Making vs. Policy Making: Toward an Antidote for Technocracy," Public Administration Review (May/June 1970); 316, and "Four Systems of Policy, Politics, and Choice," Public Administration Review (July/August 1972): 298-310.

47. Peter Schuck, "Litigation, Bargaining, and Regulation," Regulation (July/August 1979): 30.
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49. Schuck, op. cit. note 47, at p. 31.
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55. Eisenberg, op. cit. note 54, at p. 412 treats this as a 'norm'; for Fuller, op. cit. note 45, at p. 387-388, explanation is not necessary, but promotes the fairness and effectiveness of the adjudicative process.

56. Eisenberg elevates this norm to definitive importance; for Fuller, it is an ideal which should be approximated as closely as possible. Eisenberg, op. cit. note 54, at p. 412; Fuller, op. cit. note 45, at p. 388.
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71. Section 553 of the Administrative Procedure Act provides for, but does not require, oral submissions and requires the publication of proposed regulations to be accompanied by a brief statement of their basis and purpose.
72. Both the SEIA programme and the U.S. programme define "major" rules as those whose estimated costs exceed a specified economic threshold, although in the U.S. scheme the Office of Management and Budget may designate any rule a "major" rule.
73. This model is well traced out in Eisenberg, op. cit. note 54.
74. Economic Council of Canada, Responsible Regulation, op. cit. note 14 at p. 74.

75. The Occupational Safety and Health Act at the federal level in the U.S. provides for, but does not require the appointment of such ad hoc advisory committees at the stage of drafting proposed OSHA rules. Such committees are frequently appointed, and are required by the Federal Advisory Committee Act to open their meetings to the public and to make verbatim transcripts. Kelman, "Occupational Safety...", pp. 244-245. This degree of publicity would seem to mitigate the advantages of flexibility and frankness to be gained from face-to-face contact among affected interests.
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79. Schelling, op. cit., p. 29.
80. R.S.O. 1980, c. 321, s. 10(2).
81. Canada, Treasury Board, Administrative Policy Manual, Chapter 490, quoted in Economic Council of Canada, Responsible Regulation, p. 113, n. 17.
82. Ibid., p. 113, n. 20.
83. Economic Council of Canada, Responsible Regulation, op. cit. note 14, at p. n. 15.
84. Idem, quoting Standing Joint Committee on Regulations and Other Statutory Instruments, Second Report (Ottawa: Department of Supply and Services Canada, 1977), p. 84.
85. Doern, "The Political Economy..." op. cit. note 25; Economic Council of Canada, Responsible Regulation, p. 65.
86. Kelman, "Occupational Safety..." op. cit. note 53, at p. 250.
87. Ibid.
88. Public opinion polls in Canada over time have revealed such suspicion. The question, "Which do you think will be the biggest threat to Canada in years to come -- big business, big labour, or big government" is periodically posed in Gallup polls. In 1972, 1975, and 1980, a plurality of approximately 36 percent of respondents cited "big Labour." Recently, however, "big government" appears to be vying for this dubious distinction. In 1979, a plurality of 37 per cent of respondents cited "big government" and in 1981 (after the lead returned to labour in 1980), the plurality citing a threat from big government rose to 44 per cent. The Canadian Institute of Public Opinion, The Gallup Report, September 17, 1975, February 23, 1980, December 3, 1981.

CHAPTER 10 CONCLUSION

I. Four Frameworks of Evaluation

The evaluation of regulatory "solutions" to the problems posed by asbestos as a health hazard depends upon the perspective from which these problems are defined. We have outlined four such perspectives -- scientific, economic, political, and ethical -- and have assessed a range of policy instruments from each perspective. We can now briefly summarize our arguments and speculate upon the appropriate mix of policies for the regulation of asbestos-related health hazards.

Science is primarily concerned with the assessment of the magnitude of the health risk from asbestos under various conditions; economics with the achievement of a level of risk which minimizes the costs of negative health effects and the costs of investment in their prevention; politics with the development of a policy which will be supported by an effective coalition of the interests involved; and ethics with a distribution of risk burdens which meets some criterion of distributive justice. But, within each of these frameworks, decision-makers must confront substantial complexity and uncertainty.

Economic markets are marked by externalities, information costs, monopoly/monopsony, and transaction costs. The political process is characterized by a diversity of interests, constituencies, and jurisdictions. Ethical considerations require the reconciliation of conflicting rights, duties, and values, and a confrontation of the political and economic effects of unequal endowments. Political, economic, and ethical decision-making is further hobbled by uncertainties about individual and social preferences, and by the fluidity of those preferences. And these political, economic and ethical complications are exacerbated by fundamental difficulties in establishing the scientific "facts" about health hazards. Let us briefly review the dimensions of complexity and uncertainty highlighted in each of our four frameworks.

A. The Scientific Framework

As we pointed out in Chapter 2, the assessment of the magnitude of the health risk posed by asbestos is complicated by uncertainties about the biopathological processes of asbestos-related diseases, and by methodological difficulties involved in investigating those processes. Of primary concern are the shape of the dose-response curve and the role of interactive and confounding etiological factors. Scientific investigation is hindered by the long latency periods of asbestos-related diseases; by periodic changes and refinements in measurement technology; by difficulties of assembling cohort data on mobile populations over time; and by controversy over extrapolation from high-dose to low-dose effects, or from animal experiments to human populations. As a result, the risk to health from exposure to asbestos at the relatively low levels which currently prevail will remain uncertain within the time framework relevant to those who must make decisions about current exposure. Scientific estimates of risk remain matters of controversy -- controversy which tends to shift the ground of decision-making to economics, politics, and ethics, and at the same time complicates economic, political, and ethical decision-making.

B. The Economic Framework

In Chapter 3, we discussed, within an economic framework, the concept of efficient levels of safety and risk. Neither a zero-risk of adverse health effects nor an absolute certainty of such effects in given settings is likely to be an efficient outcome. In a perfectly functioning market, affected parties would bargain to an outcome where the social resources expended on abatement precautions just equalled the social costs of health hazards (a Pareto-optimal level of safety and risk). Any lesser level of precaution would mean that mutual gains could be realized by further abatement. Any higher level of precaution would mean that the social gains from abatement are less than the costs of achieving it.

However, real-world markets do not function perfectly and sources of market failure, such as information costs, transaction costs, and monopoly/monopsony, may prevent the Pareto-optimal levels of safety and risk being attained. In this event, the economic framework would countenance public intervention to correct for these market failures and to attempt to replicate, by regulation or otherwise, the outcomes of perfectly functioning markets.

However, in order to do this successfully, the regulators require to know both the social costs of health hazards and the social costs of investments in abatement precautions. Often, both these functions will be very imperfectly discoverable, especially in the case of health hazards of the kind presented by asbestos where very long lags occur between exposure and symptoms, and a high degree of scientific and factual uncertainty and controversy tends to surround key causal relationships.

C. The Political Framework

In the political arena as discussed in Chapter 4, the problem is the development of a policy which will engender sufficient support among relevant constituencies of interest so that the policy itself will not be effectively vetoed, and its political sponsor will remain in (or gain) office. Currently, the pattern of demand and support for policies regulating health hazards is complex, volatile, and fluid.

As part of the general "politics of prevention" surrounding health policy, governmental decision-makers face a general, diffuse demand for protection from health hazards. The lack of articulation of specific preferences regarding risk reduction is due to a number of factors: scientific complexity and uncertainty concerning the magnitude of health risks; the waxing and waning of public concern as particular hazards are

brought to public attention through periodic dramatic events or media campaigns; the difficulties of political mobilization of groups of workers or consumers who may not perceive themselves as unambiguous winners or losers from controls on hazardous substances; and the somewhat related problems of mobilizing organized pressure for policies whose benefits are likely to be widespread and available to "free-riders." Despite these problems, however, the configuration of demand and support for risk-reduction policies is shifting, as organized labour and environmental protection groups become more politically mobilized in this arena.

On the other hand, governments face an organized constituency of producer interests who would bear, at least in the first instance, the costs of risk-reduction. These interests are relatively concentrated, articulate in their preferences, and well-informed about the relevant technology and costs of risk-reduction, if not about the potential health benefits. And it is these producer interests upon whose compliance the effectiveness of a given policy ultimately depends.

The political problem is hence to forge a policy which offers a broad symbolic response to the diffuse demand for risk-reduction while providing sufficient flexibility for negotiation with the mobilized and mobilizing groups who could effectively veto or "blow the whistle" on policies they consider unacceptable, either at the development or the implementation stage. Given the fluidity of the current politics, however, governmental decision-makers may have considerable room for manoeuvre in shaping subsequent political behaviour through the instruments they put in place.

D. Ethical Framework

In Chapter 5, we reviewed various ethical perspectives on risks to life, health, and safety. Essentially two perspectives were contrasted: a utilitarian and a Kantian. A utilitarian perspective would, much like the economic framework, subject issues of safety and risk to a kind of social cost-benefit analysis. Are more social benefits derived from a given level of safety and risk than the social costs imposed on the risk-bearers? A Kantian perspective would, on the other hand, stress the paramount ethical value placed on individual autonomy and the importance of not threatening that autonomy by subjecting individuals to risks to life and health that jeopardize their prospects of living out their lives in a dignified and fulfilling way. While all risks to life and health cannot be eliminated in any society, at least the burden of them should not be disproportionately distributed. A widely participatory and accessible set of institutional arrangements for determining socially acceptable levels of risk in particular settings seems suggested by the Kantian emphasis on equality in the burdens of risk-bearing.

II. The Instruments

A. Improving Bargaining Processes

In Chapter 6, we began a review of possible policy options for regulating asbestos-related health hazards. In this chapter, we emphasized the elements of explicit or implicit bargaining processes entailed in each. In correcting for market failure in explicit markets (e.g., labour markets), information and transaction costs and perhaps the effects of monopsony have to be overcome. However, even if public intervention is contemplated, the same affected interests are likely to be interacting in whatever collective decision-making processes are chosen. These interactions

are likely to display bargaining characteristics to a greater or lesser extent. To the extent that implicit bargaining is involved among these interests, then the bargaining disabilities that handicapped some of these interests in explicit, unregulated, market settings are likely also to affect the degree of influence that these interests can bring to bear on the collective decision-making process involved. To the extent that these disabilities are corrected for, then their implicit bargaining processes are likely to become dominated by distributive considerations and be little concerned with efficiency considerations.

B. Civil and Criminal Liability

In Chapter 7, we discussed the potential roles of civil and criminal liability in controlling health hazards. Three civil liability regimes were discussed: negligence; private enforcement of publicly prescribed standards; and strict liability. Strict liability, particularly with liberal class action rules grafted thereon, seem to possess the most desirable efficiency properties, measured against allocative, dynamic, and administrative efficiency criteria. However, given the polycentric nature of many of the issues involved in controlling health hazards (multiple interests, multiple effects, etc.), the institutional competence and appropriateness of the courts relative to other agencies of government are questionable. The limited participatory character of formal adjudicative processes may be objectionable on ethical grounds. The limited expertise of courts in dealing with complex and controversial scientific issues may not meet scientific imperatives. The atomized nature of this response to controlling health hazards may violate political imperatives that require at least a strong symbolic response to the demand for controls.

C. Taxes and Subsidies

In Chapter 8, we discussed the possible deployment of taxes and subsidies as control mechanisms. A tax on sources of adverse health effects, structured so as to impose on the firms responsible the full social costs of their activities, in theory possesses attractive efficiency characteristics. However, in cases involving long lags between exposure and symptoms and scientific uncertainty and controversy surrounding key causal relationships, structuring a tax so as to yield Pareto-optimal levels of safety and risk is a highly speculative exercise. Moreover, the closed nature of the bureaucratic processes likely to be involved in the administration of a tax may render it unacceptable on scientific, ethical, and political grounds. Subsidies to facilitate abatement or to induce retraining, relocation, or retirement of workers subjected to unacceptable levels of risk may be ethically attractive if the economic viability of the industry in question would not otherwise permit desired levels of risk reduction. Subsidies may also be politically attractive to the extent that they shift the costs of abatement from concentrated cost-bearers (e.g., firms in an industry) to thinly spread cost-bearers (e.g., taxpayers at large), and to the extent that they encourage a non-confrontational, "pork-barrelling" style of politics. Subsidies, on the other hand, may be inefficient to the extent that they encourage excessive entry into an industry and to the extent that they encourage the promotion of policies that reduce risk levels below Pareto-optimal levels.

D. Public Standard-Setting

We turned, in Chapter 9, to a consideration of a programme of administered standards, under which a governmental agency is charged with establishing and enforcing maximum permissible levels of exposure to

asbestos in a variety of contexts. Public standard-setters must confront the problems of scientific complexity and uncertainty, of the valuation and aggregation of individual health benefits, and of access to industry-held data regarding the costs of risk-reduction, which bedevil decision-makers under the policies discussed previously. No single decision rule -- neither a "zero-risk" nor a "best available technology" principle, nor a cost-benefit approach -- can guide standard-setters through the political, economic, and ethical thickets which surround the determination of optimal levels of exposure. These optimal levels are inescapably complex matters of judgement -- what is crucial, then, is whose judgement is brought to bear on the decision.

We have argued that the process of judgement should be participatory and have proposed a consultative model of standard-setting. The elements of this model are as follows: the promulgation of standards as regulations made by the Lieutenant Governor in Council under enabling legislation; an advisory committee composed of representatives drawn from constituencies of affected interests; and a notice and comment procedure whereby draft regulations are published, a comment period allowed, and submissions (including those of the advisory committee) made available for public inspection.

In fact, this model is very close to that which pertains in the setting of standards for exposure to occupational health hazards under The Occupational Health and Safety Act in Ontario. The transposition of this model to deal with the environmental hazards posed by asbestos raises more troublesome problems relating to the variety of relevant pieces of legislation, and the difficulties of representing diffuse third-party interests in the consultation process. Nonetheless, the Environment Ministry would seem the logical institutional focus, and the increasingly mobilized set of environmental interest groups a fruitful source of informed third-party comment.

We have concluded, indeed, that this consultative model of public standard-setting is the best (or more correctly the least imperfect) of the instruments we have surveyed, and that it should form the centrepiece of the public policy response to asbestos-related health hazards.

From a political perspective, such a policy offers a symbol of the control of health hazards and the channelling of group conflict under the authority of the state. While responding in this way to diffuse anxieties and uncertainties, it also allows for pragmatic bargaining with strategic groups over the level of the standard and the schedule of penalties for violations, including the range within which violations will be tolerated. Furthermore, broadly based participation in standard-setting is more likely than either unilateral state action, private bargaining, or litigation to generate support for the programme -- both by conferring greater legitimacy on the outcome and by shaping mutual perceptions in the course of considering and revising concrete alternatives. From an ethical point of view, this consultative model gives those who bear risk burdens a voice in decision-making about their distribution, and access to the data and arguments advanced by all parties.

From a scientific perspective, this consultative standard-setting model provides for more direct scientific input than does private bargaining, while allowing for a freer ventilation of scientific disagreement than is possible through judicial or bureaucratic processes. And although it requires action on a standard before all scientific evidence is in, it provides, through the monitoring and enforcement process, for the generation of data regarding exposure levels over time.

There remain, however, significant flaws in this model as we have presented it here. To a large extent these flaws arise from tensions among political, ethical, and economic considerations. A consideration of

these flaws, and of possible remedies, forms the basis of our final task in this paper -- a brief speculation on the optimal mix of instruments to be employed in dealing with asbestos-related health hazards.

III. The Optimal Mix of Instruments

From our review of policy instruments for controlling asbestos-related health hazards, it seems an appropriate conclusion that a standard-setting process, at least designed as we have suggested, is superior to the other instruments evaluated on scientific, political, and ethical criteria. Its comparative strengths from an efficiency perspective are more debatable.

Considerations of allocative efficiency demand that the penalty schedule confront the violator with the full social cost of his violation. We argued in Chapter 8 that a standard is likely to be efficient only where a safe threshold can be assumed. In the case of asbestos, this assumption cannot be made. Furthermore, sanctions for violations of the standard in force may not reflect the different degrees of social costs involved in different degrees of divergence from the standard; and the standard itself (given the implicit political bargaining processes that are likely to yield it) is unlikely to reflect an efficiency (welfare maximizing) objective. Finally, the administrative efficiency of the system needs to be considered. Confronting a violator with the full social costs of violations of a standard requires either frequent monitoring to capture a significant proportion of violations or very high fines per violation to compensate for infrequency of monitoring. Whether some mix of instruments can mitigate these shortcomings while preserving the strengths of a standard-setting regime is an important and difficult question.

A tax system, as we have seen, possesses, in theory, strong efficiency properties. It avoids the assumption of a safe threshold and imposes

taxes on sources of the health risks that are proportionate to the health risks created at different levels of exposure. A strict liability regime, in theory, achieves a similar result. However, once a collective decision has been made that a given standard reflects a socially acceptable level of safety and risk, it would seem politically (and perhaps ethically) difficult to justify imposing costs, on deterrence grounds, on firms for levels of exposure that fall below, and comply with, the standard. Whether a case exists for this on compensatory or insurance grounds has not been examined in this study. If such a case exists, a tax would not achieve this end; the choice would narrow to strict civil liability or workers' compensation.

On the other hand, our analysis of tax and civil liability regimes might suggest some implications for structuring the sanctions associated with violations of prevailing standards. A scaled set of penalties reflecting the increasing social costs generated by increasingly serious departures from the prescribed standards would seem to ensure that potential violators more fully weigh the consequences of their actions.

Implicit in the establishment of a standard-setting system, however, is the assumption that it offers a set of compliance incentives which is broader than the monetary penalties for violation. It assumes that the standard carries a moral weight and a political legitimacy. But even in these political and ethical dimensions of enforcement we encounter tensions. A flexible and accommodative enforcement strategy, relying heavily on "voluntary" compliance and tolerating occasional violations, may be seen as necessary in order to maintain strategic political support for the standard. There are extremely difficult judgements to be made as to when such accommodative practices cease to encourage "voluntary" compliance on balance, and rather amount to state condoning of ethical injustices. The Ontario Government has sought to resolve these political and ethical tensions in the

occupational arena through the establishment of an "internal responsibility" system based on joint health and safety committees, but it may still be necessary, in the occupational as well as the environmental arena, to strengthen the role of private enforcement on both administrative and ethical grounds.

According to aggrieved parties a civil right of action for standards violations, in which all damages suffered would be recoverable, may reinforce the effects of scaled penalties as well as maintaining or enhancing the vigour of the enforcement process. The necessarily imperfect nature of participation in both the processes of setting and enforcing standards may also argue for facilitating impacts on, or inputs into, these processes from parties not directly involved in them.

An offsetting political consideration may be that if a civil liability regime is grafted onto a standard-setting regime (particularly if the former is supplemented with liberal class action rules), political tensions will be set up between the accommodative, consensus-oriented dynamics of the standard-setting process and the more confrontation-oriented interactions likely to be involved in an aggressively structured civil liability regime. These tensions may jeopardize, to some degree, the effective functioning of the standard-setting regime, given the "wild card" element that the possibility of private enforcement creates.

If, despite this reservation, private enforcement of standards is to be provided for, effective incentives to sue must be created. To achieve this, the immunity from civil suit presently enjoyed by employers under The Workmen's Compensation Act would presumably have to be statutorily waived so that the receipt of benefits under that Act would not preclude suit or perhaps even be taken account of in damage awards in civil actions for standards violations. Such a mix of instruments would, of course, contenance the possibility of triple exposure to financial liability on the

part of firms violating publicly prescribed standards: scaled penalties for standards violations, civil liability, and workers' compensation pay-outs. This carries some analogies to the treble damage suit provided for in U.S. law for antitrust violations. Given the extremely limited coverage of adverse health effects under workers' compensation legislation (see Chapter 8), and given necessarily limited public enforcement resources and therefore less than comprehensive policing of standards violations, this policy matrix, in a world that allows only second-best or imperfect choices, may be a defensible one in terms of a reasonable balancing of scientific, ethical, political, and economic considerations.

The role of subsidy instruments falls finally to be considered in an optimal policy matrix. As we have argued earlier in this study, ethical imperatives may call for the provision of subsidies where, because of economic constraints, socially acceptable levels of risk cannot be attained in their absence. It is unlikely that either labour or management in asbestos-related industries would agree to a standard which reflected the full social costs of the health risks from asbestos but thereby rendered the industry non-viable. Rather than imposing these full social costs on the industry, there may be an ethical argument for empowering the standard-setting agency to recommend subsidies (for abatement technology, or worker severance, retraining, or relocation) where these constraints are binding. Obviously, subsidies are politically attractive in other contexts as well, where concentrated and politically influential interests can transfer the costs of abatement (which do not exceed these economic constraints) to less concentrated and less politically effective interests. While politically attractive, the use of subsidies in these contexts is not economically or ethically defensible.

In summary, a mix of instruments that has strong attractions in terms of our four frameworks of analysis would entail a central role for a widely participatory standard-setting process, scaled penalties for violations of the prescribed standards, private rights of enforcement for damage suffered as a result of standards violations, and the availability of subsidies where socially acceptable levels of risk cannot otherwise be achieved without endangering the viability of the industry affected and levels of employment in it.

Our analysis has, given our terms of reference, been relatively general and has abstracted from institutional and setting-specific details. The generality of our analysis leaves open the issue of whether a single regulatory regime is appropriate for all settings in which asbestos-related health hazards arise, or whether regulatory regimes should be designed for each setting.

Without attempting to answer this question, it may be appropriate to identify design variables that may be affected by circumstances specific to the setting in question. For example, comparing the regulation of occupational health hazards with the regulation of environmental health hazards, several factors may call for special consideration in the latter case. First, the issue of the representation and participation of affected constituencies in a standard-setting process may be more problematic in the case of environmental regulation than in the case of occupational health regulation. Environmentally affected constituencies often tend not to be as well-defined or as well-organized as worker interests and thus less well-equipped to participate effectively in the standard-setting process. Providing public funds or other forms of support for the activities of politically disadvantaged groups may go some distance towards meeting this concern, but it raises difficult administrative problems regarding eligibility and may threaten to de-stabilize evolving political alliances.

Secondly, because of problems of securing effective participation by these thinly spread interests, private rights of action for standards violations may be even more important in the environmental than in the occupational health setting so that an adequate range of impacts on, or inputs into, the standard-setting and enforcement process is ensured.

Thirdly, the role of subsidy policies in the regulation of environmental health hazards would seem less ethically compelling than in the case of occupational health regulation. In the former case, the risk-bearers do not face the potential constraint of assuming the risks or abandoning their jobs. Subsidies are not therefore required to ensure the removal or reduction of these risks without putting the risk-bearers to an ethically unacceptable choice. Whether there is still a case for subsidies to prevent job loss in industries required to abate environmental health hazards, even though those suffering the job losses are not also the risk-bearers in relation to the health hazards in question, is more problematic. The resolution of this question turns on general issues of distributive justice not related to the special ethical claims that can be made by individuals exposed to disproportionately high risks to life and health.

To conclude, a consultative system of public standard-setting appears, on a balance of scientific, political, economic, and ethical considerations, to be the instrument best suited for a central role in controlling asbestos-related health hazards. Such a system nonetheless needs to be buttressed with a structure of related instruments. The stress which the various components of this overall structure will be required to bear, moreover, is likely to vary somewhat in the different contexts in which asbestos-related hazards arise.



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